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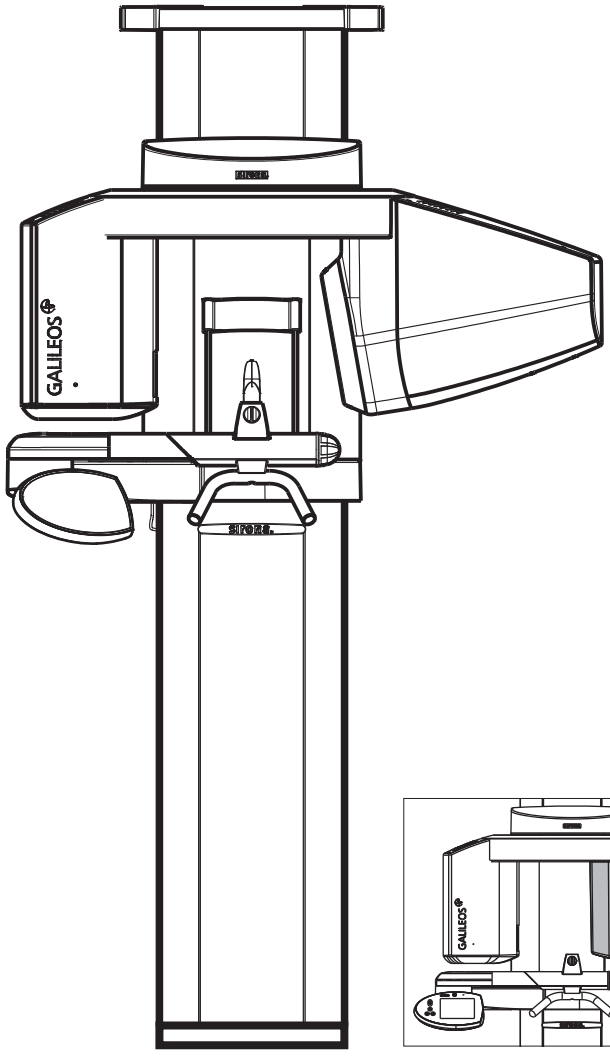
sirona
The Dental Company

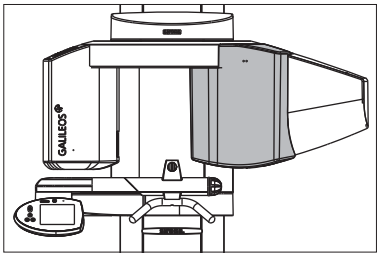
GALILEOS

as of Unit software V04.12.00

Service Manual (as of February 2013)

English





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1 About this Service Manual

1.1 Scope

This Service Manual describes the service work for the digital volume tomographs "GALILEOS Comfort", "GALILEOS Comfort^{PLUS}", and "GALILEOS Compact" **for unit versions supplied as of February 2013**. It is intended for use exclusively by trained and authorized distributors and service technicians.

1.2 Other documentation required

In addition to this manual, you need the following documents:

Spare parts list

- GALILEOS List of Spare Parts: Order no. 61 25 699

Wiring diagrams

- GALILEOS Wiring References: Order no. 61 25 640

Installation Instructions

- GALILEOS Installations Instructions: Order No. 61 25 574
- GALILEOS / ORTHOPHOS XG 3D Software installation: Order No. 61 42 389
- GALAXIS Operator's Manual: Order No. 61 23 488
- SIDEXIS XG Digital Radiography Installation Instructions: Order no. 59 67 356

You can order the technical documentation in paper form free of change from our Customer Service Center by specifying the above mentioned order numbers (REF).

You can also download the latest user documentation, such as instructions for use, from the Sirona homepage (www.sirona.de HOME ⇨ Service ⇨ Technical Documentation).

1.3 Tools and auxiliary materials

- GALILEOS service set: Order No. 6146562
- Screwdriver set (slot and Phillips)
- Torx offset screwdrivers TX10, TX20, TX25
  (included in the scope of supply)
- Hexagon socket-head screwdriver, hexagon socket-head screw size 6 mm
  (included in the scope of supply)
- Open-end wrench, 13 mm A/F
- Socket wrench, 13 mm A/F, 17 mm A/F, 18 mm A/F
- Side cutting pliers

- Spirit level
- Digital Multimeter, Accuracy Class 1
- Mult-O-Meter 512L
- Soldering tool for repairing cables
- Cable ties
- Teflon tape
- Loctite

1.4 Structure of the document

1.4.1 Identification of the danger levels

To prevent personal injury and material damage, please observe the warning and safety instructions provided in this document, which are highlighted as follows:

⚠ DANGER

Imminent danger that could result in serious bodily injury or death.

⚠ WARNING

Potentially dangerous situation that could result in serious bodily injury or death.

⚠ CAUTION

Potentially dangerous situation that could result in slight bodily injury.

NOTICE

Potentially harmful situation which could lead to damage of the product or an object in its environment.

IMPORTANT

Instructions for use and other important information.

Tip: Information for simplifying work.

1.4.2 Formats and symbols used

The formats and symbols used in this document have the following meaning:

✓ Prerequisite **1.** First action step **2.** Second action step or ➢ Alternative action ↳ Result	Requests you to do something.
See “Formats and symbols used [→ 12]”	Identifies a reference to another text passage and indicates the relevant page number.
• List	Identifies a list item.
"Command / menu item"	Identifies commands / menu items or a quote.

2 Safety instructions

2.1 Modifications to the unit

Modifications to this unit which might affect the safety of the system owner, patients or other persons are prohibited by law!

For reasons of product safety, this product may be operated only with original Sirona accessories or third-party accessories expressly approved by Sirona. The user is responsible for any damage resulting from the use of non-approved accessories.

2.2 Fixed connection

⚠ DANGER

Potentially lethal shock hazard!

Fixed connection!
Installing a mains plug instead of the specified fixed connection infringes international medical regulatory actions and is prohibited. In case of error, this puts patients, users, and other parties seriously at risk.

2.3 Electromagnetic compatibility

The unit complies with the requirements of standard IEC 60601-1-2.

Medical electrical equipment is subject to special EMC preventive measures. It must be installed and operated as specified in the document "Installation Requirements".

If high-voltage systems, radio link systems or MRI systems are located within 5 m of the unit, please observe the specifications stated in the installation requirements.

Portable and mobile RF communications equipment may interfere with medical electrical equipment. Therefore, the use of mobile wireless phones in medical office or hospital environments must be prohibited.

2.4 Electrostatic discharge

Electrostatic discharge (abbreviated: ESD – **E**lectro**S**tatic **D**ischarge)

Electrostatic discharge from people can damage electronic components when the components are touched.

Touch a ground point to discharge static electricity before touching any boards.

2.5 Switching the unit on

Due to the risk of injury caused by malfunction, no person may be positioned in the unit when it is switched on.

2.6 Condensation

Extreme fluctuations of temperature may cause condensation inside the unit. Do not switch the unit on before it has reached normal room temperature. See also Technical Data.

2.7 Laser light localizer

LASER KLASSE 1
CLASS 1 LASER PRODUCT
APPAREIL A LASER DE CLASSE 1
Date of manufacture:
August 2007
Complies with 21 CFR 1040.10 and 1040.11
except for deviations pursant to
Laser Notice No. 50, dated (June 24, 2007)
Sirona Dental Systems GmbH
Fabrikstr. 31
D-64625 Bensheim, Germany
Manufactured in Bensheim

The system incorporates Class 1 laser products.

A minimum distance of 10 cm (4") is required between the eye and the laser. Do not stare into the beam.

Do not use the system with any other lasers, and do not make any changes to settings or processes that are not described in these operating instructions. This may lead to a dangerous exposure to radiation.

2.8 Ventilation slots

Never cover the ventilation slots on the unit under any circumstances, since this may obstruct air circulation. This can cause the unit to overheat.

2.9 Qualifications of service personnel

Installation and startup may be carried out only by personnel specifically authorized by Sirona.

2.10 Radiation protection

The valid radiation protection regulations and measures must be observed. The statutory radiation protection equipment must be used.

During an exposure, the service engineer should move as far away from the X-ray tube assembly as the coiled cable of the manual release permits.

With the exception of the service engineer, no other persons are allowed to stay in the room during an exposure.

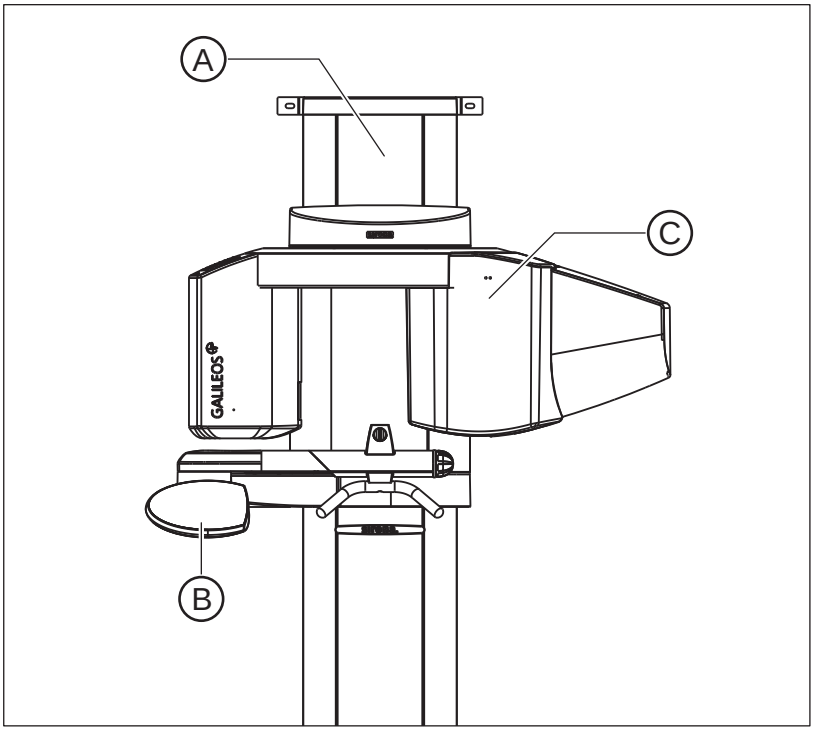
In case of malfunctions, cancel the exposure immediately by letting go of the exposure release button.

2.11 Safety checks

After implementing repair work, protective conductors and device leakage current checks must be carried out (see the sections on "Checking protective conductor" and "Checking device leakage current").

3 Unit description

3.1 Unit classes and versions



A	GALILEOS unit*
B	Control panel
C	FaceScan (optional)

3.1.1 Control panels

The "Comfort/Comfort^{PLUS}" and "Compact" unit classes differ by the equipment of the control panel (B). While the GALILEOS Comfort class features a control panel with a color touchscreen (Easypad), the Compact class is equipped with a simpler control panel with a single-line display (Multipad). Due to their different control panels, the operating procedures for these two system classes also vary.

3.2 Hardware

3.2.1 Information on the unit

The following symbols are applied to the unit:

Accompanying documents

This symbol is affixed next to the unit rating plate.

Meaning: When operating the unit, observe the operating instructions.

This symbol is affixed on the unit rating plate.

Meaning: The accompanying documents are available on the homepage of Sirona.

Electrostatic discharge (ESD)

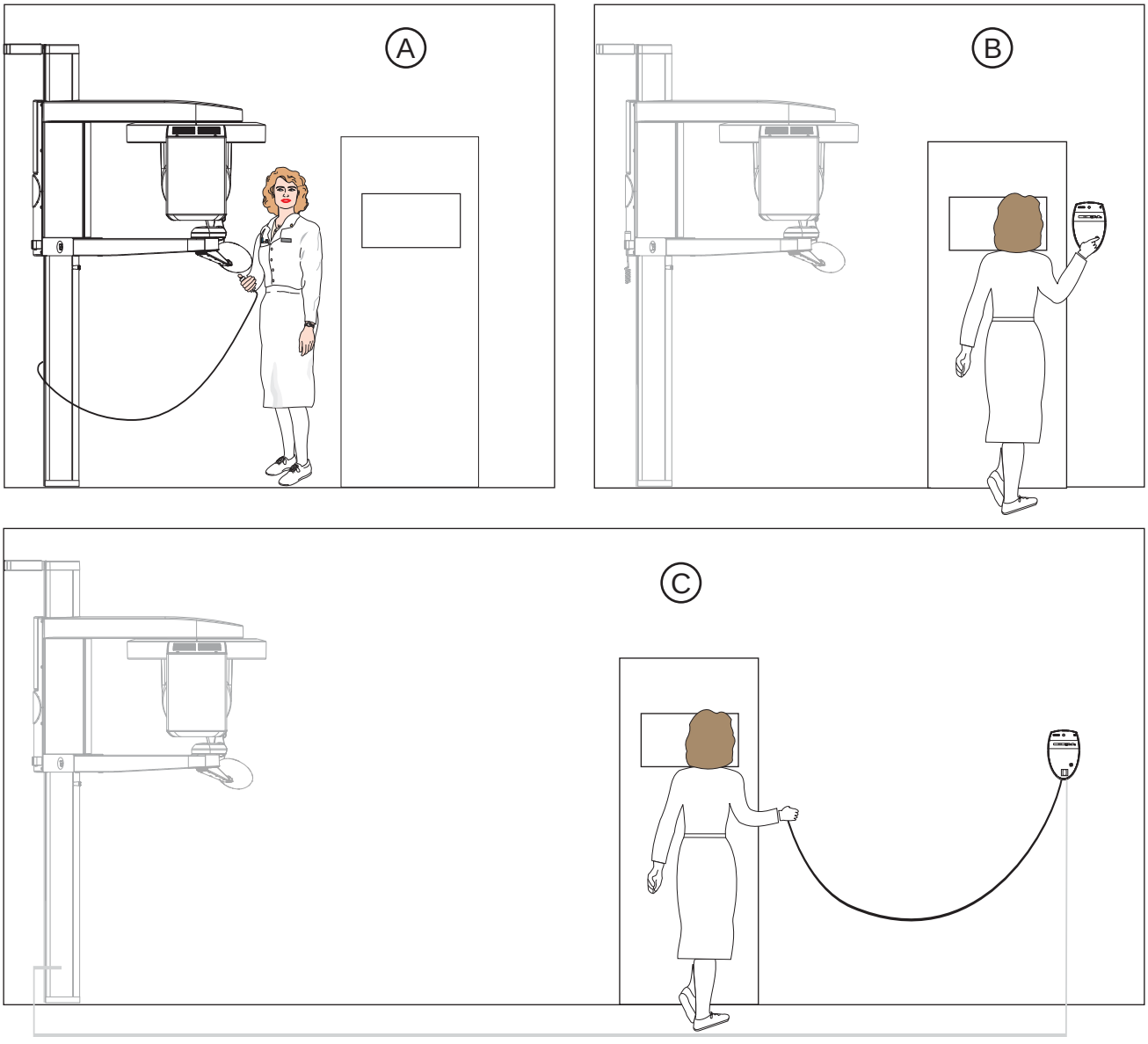
Connector pins or sockets bearing ESD warning labels must not be touched or interconnected without ESD protective measures. See also "Electrostatic Discharge" and "Electromagnetic Compatibility" [→ 14].

Identification of single use devices

Prior to each exposure, the hygienic protective sleeves (single use devices) must be fitted.

Single use devices are identified with the symbol shown on the left. They must be disposed of immediately after use. Do not use single use devices more than once.

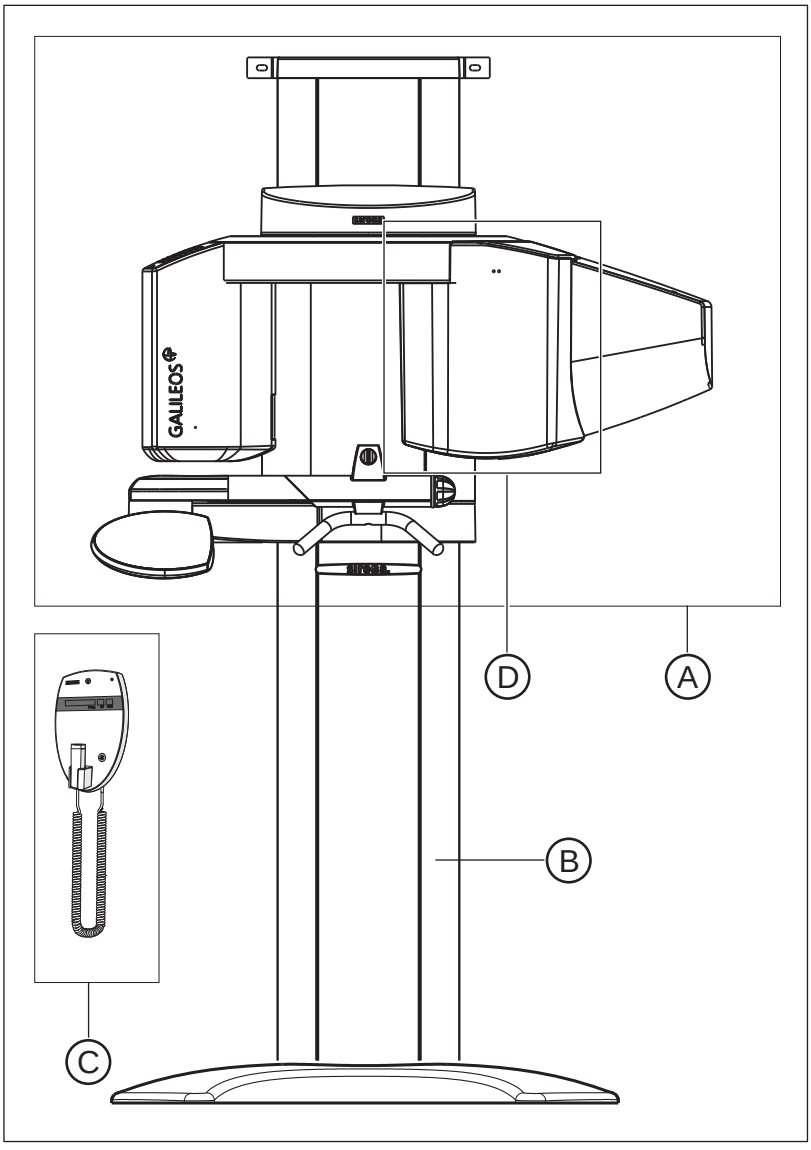
3.2.2 Installation versions



The unit can be equipped with...

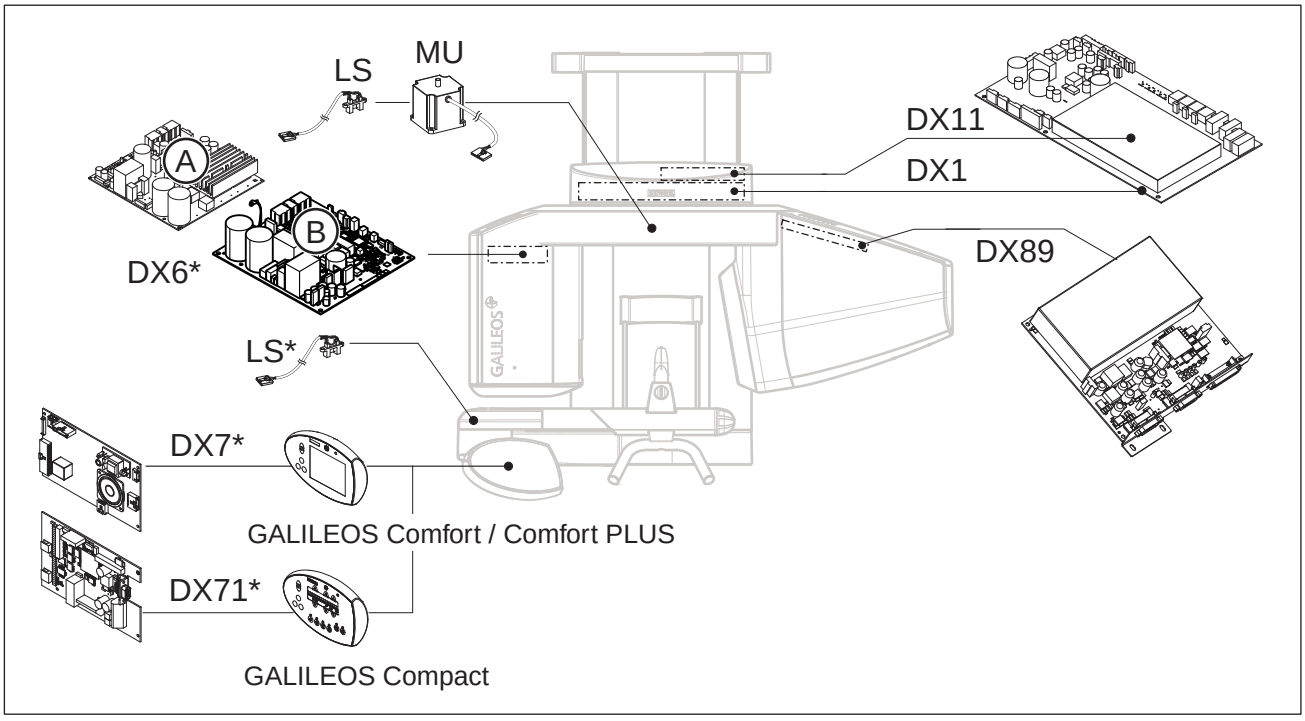
- a 1-3 m coiled cable with release button inside the treatment room (**A**) or ...
- a remote control with or without coiled cable (**B+C**) located outside the X-ray room (see also installation instructions).

3.2.3 Modules and components



A	Slide
B	Stand
C	Remote control [→ 21]
D	FACESCAN [→ 22] (optional)

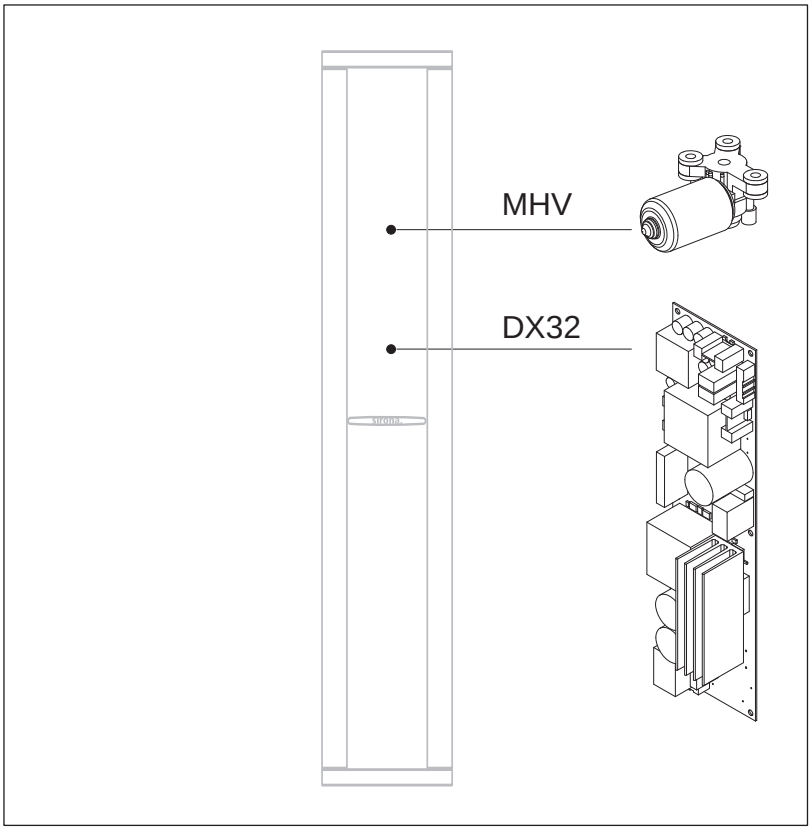
3.2.3.1 Slide



Component	Designation		Function
Boards	DX1		Open loop/closed loop control in general
	DX11		Controller board
	DX6*	(A)	Open loop/closed loop tube assembly (GALILEOS Comfort/ Compact)
	DX6*	(B)	Open loop/closed loop tube assembly (GALILEOS Comfort^{PLUS})
	DX7*		Easypad touchscreen (GALILEOS Comfort)
	DX71*		LED display on Multipad (GALILEOS Compact)
	DX89		Image memory of the X-ray detector
Motor	MU		Rotary movement of rotating element
Light barriers	LS		Position control of the ring cycle
	LS		Position control of the swivel arm

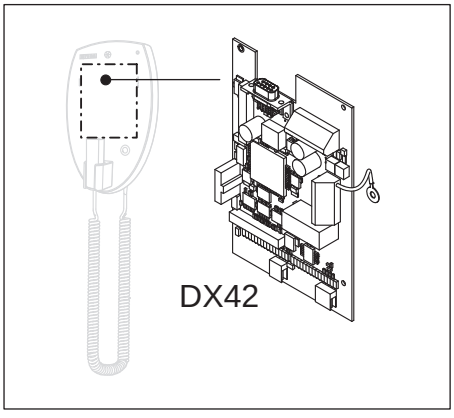
*) not available as individual repair part (see spare parts list).

3.2.3.2 Stand



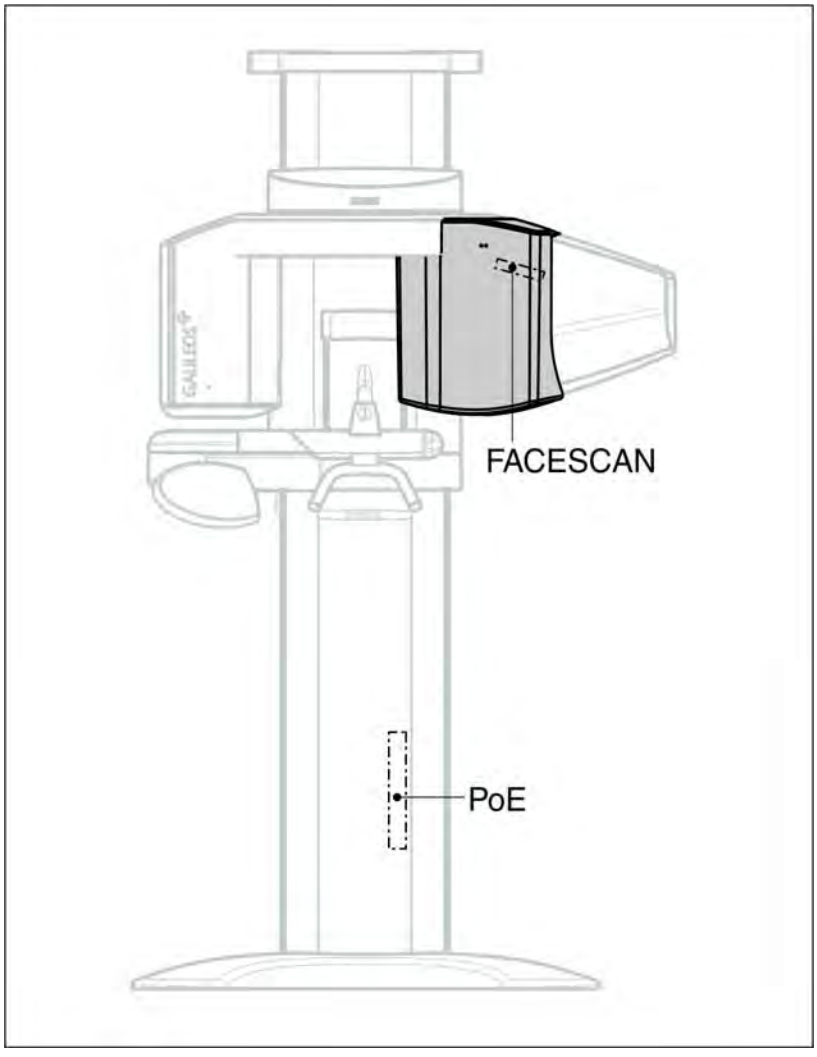
Component	Designation	Function
Boards	DX32	Power supply board
Motor	MHV	Linear movement of height adjustment

3.2.3.3 Remote control



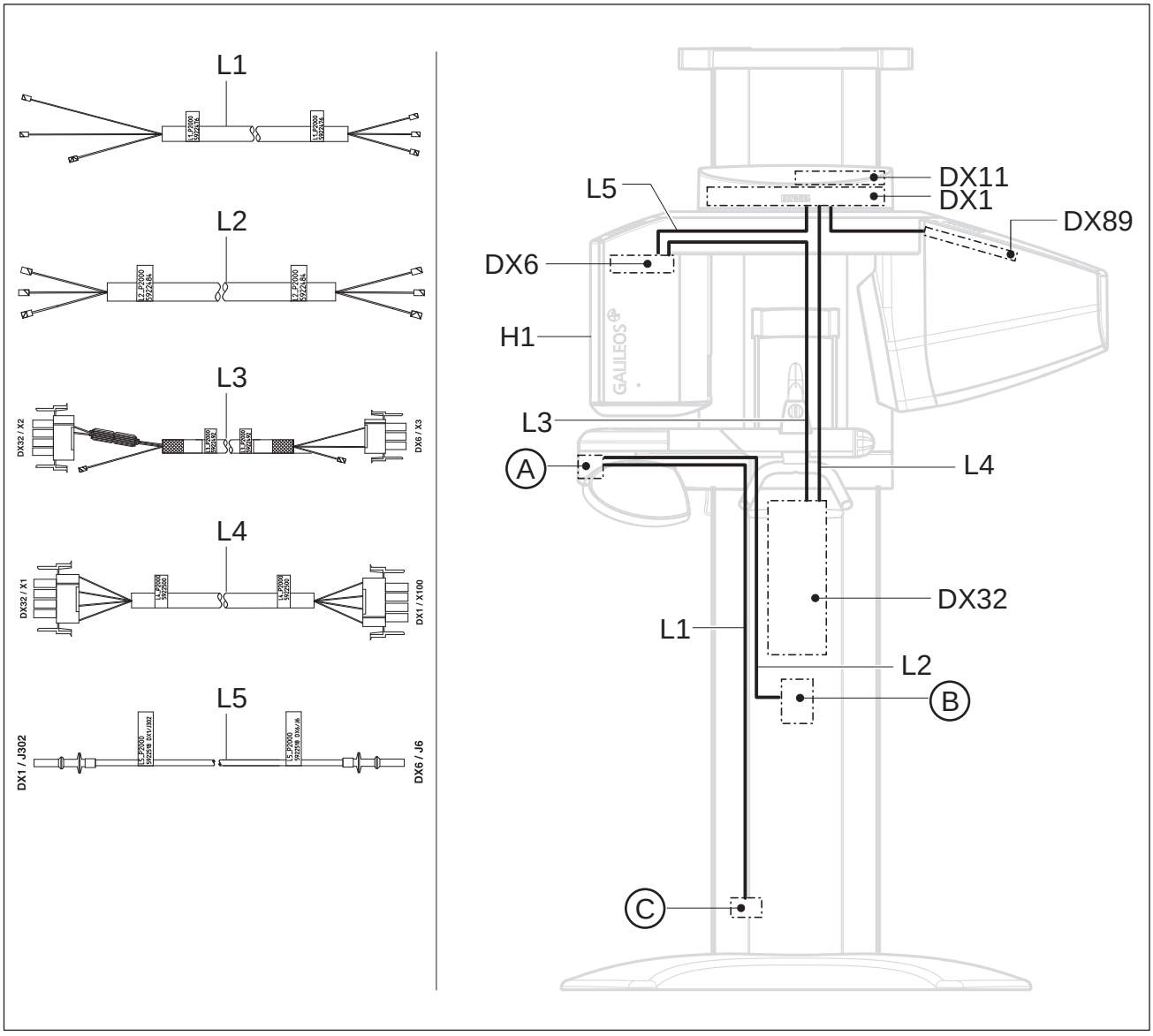
Component	Designation	Function
Board	DX42	Display board for remote control

3.2.3.4 FaceScan

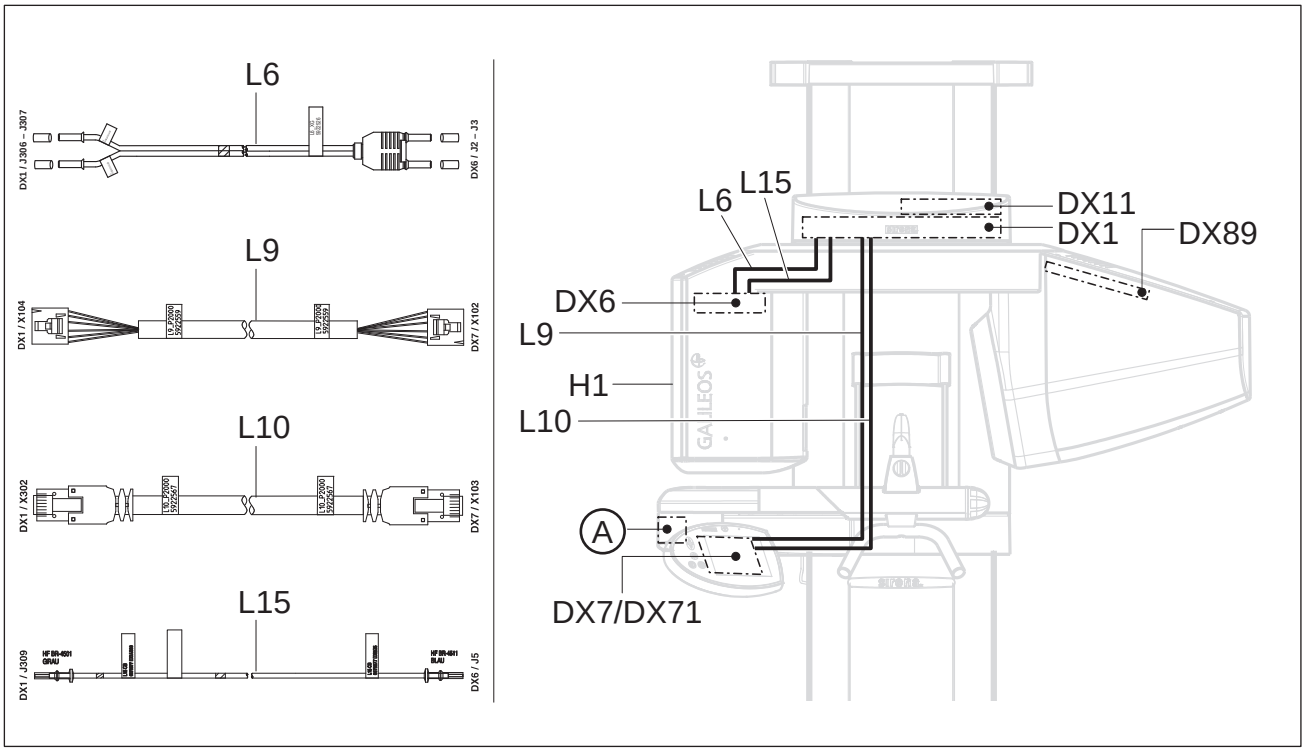


Component	Designation	Function
Boards	FACESCAN	Modular board
	PoE	Power supply board

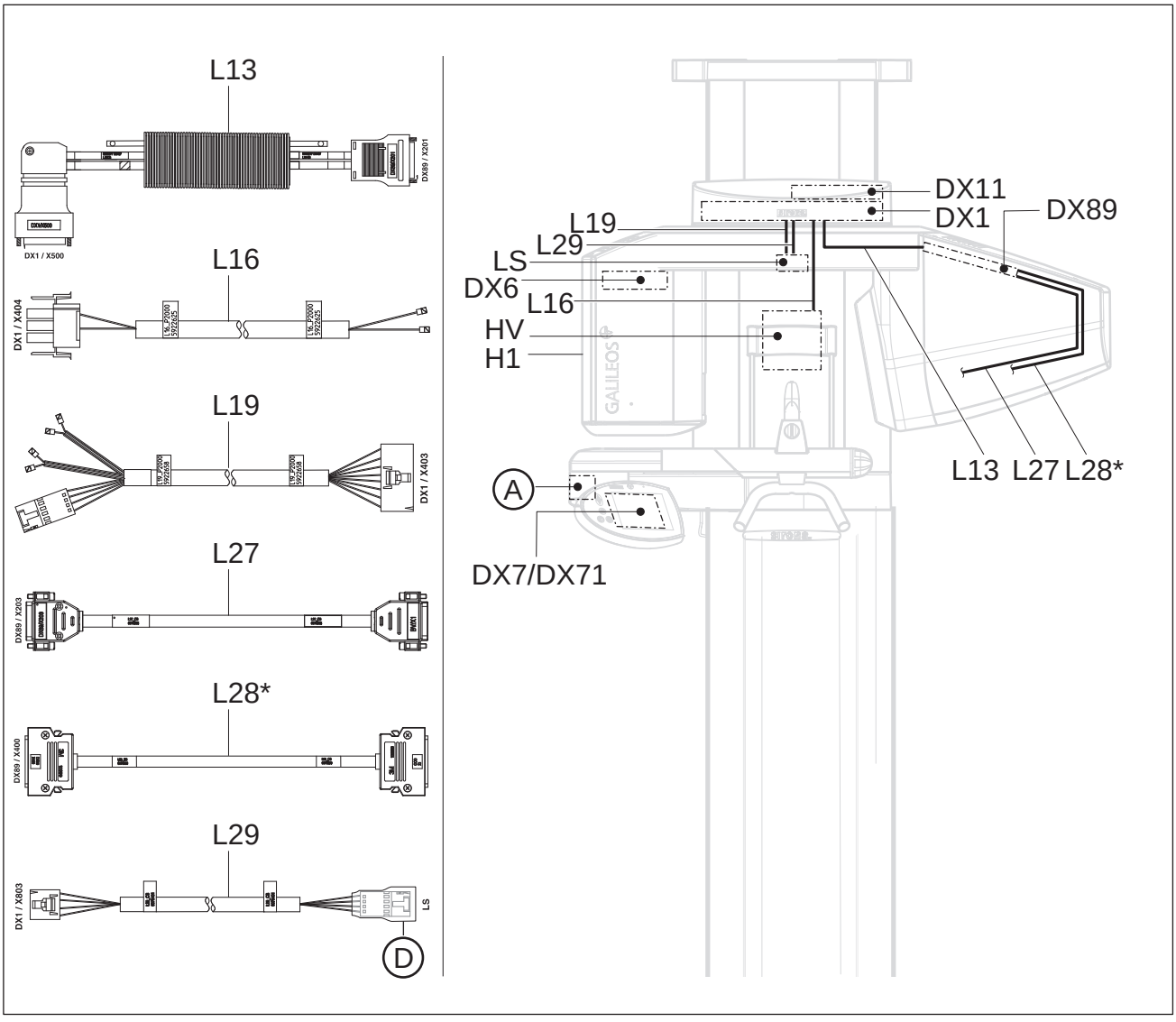
3.2.4 Cabling overview



A	Power switch
B	Line filter
C	Wago terminal

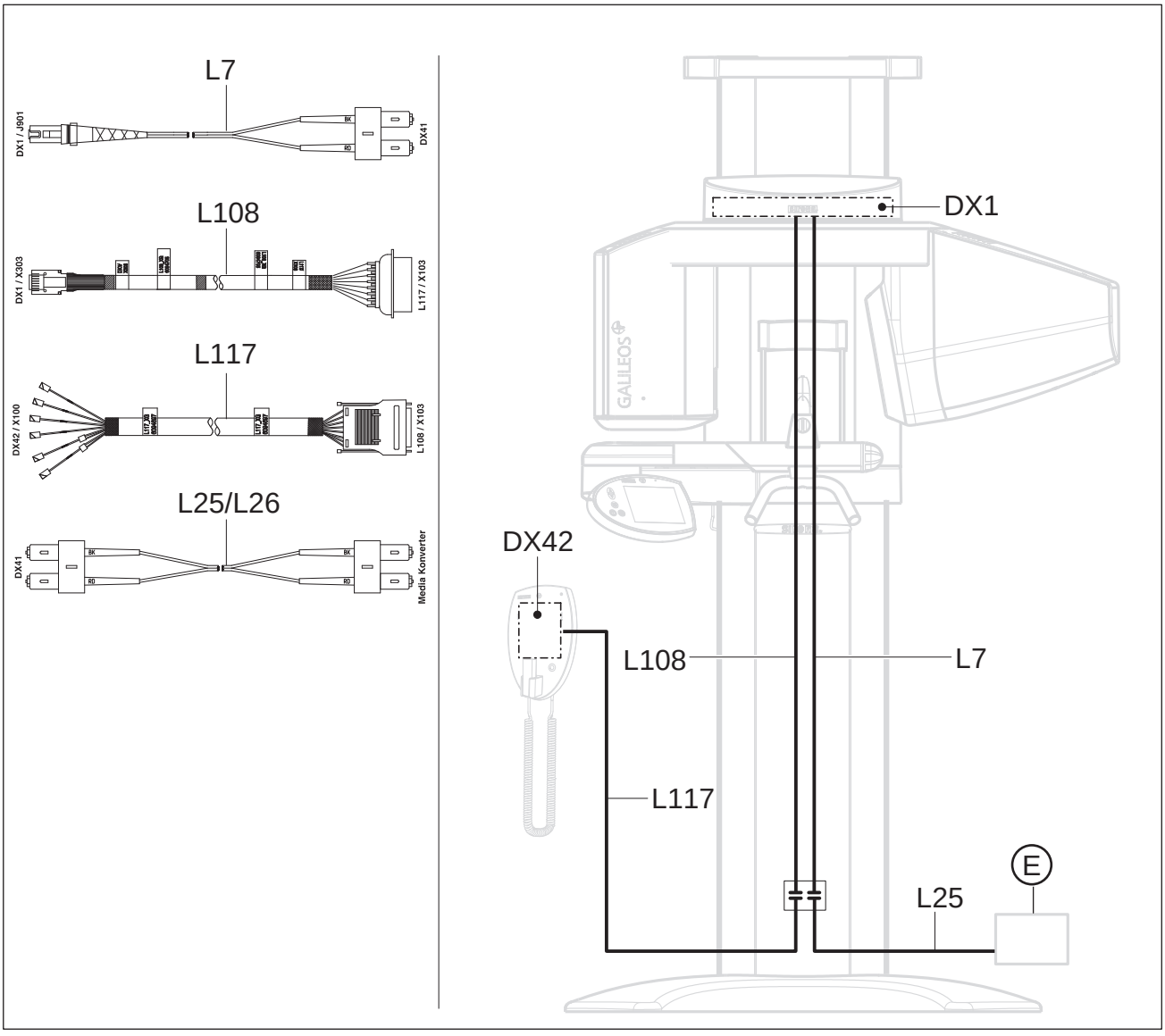


A	Power switch



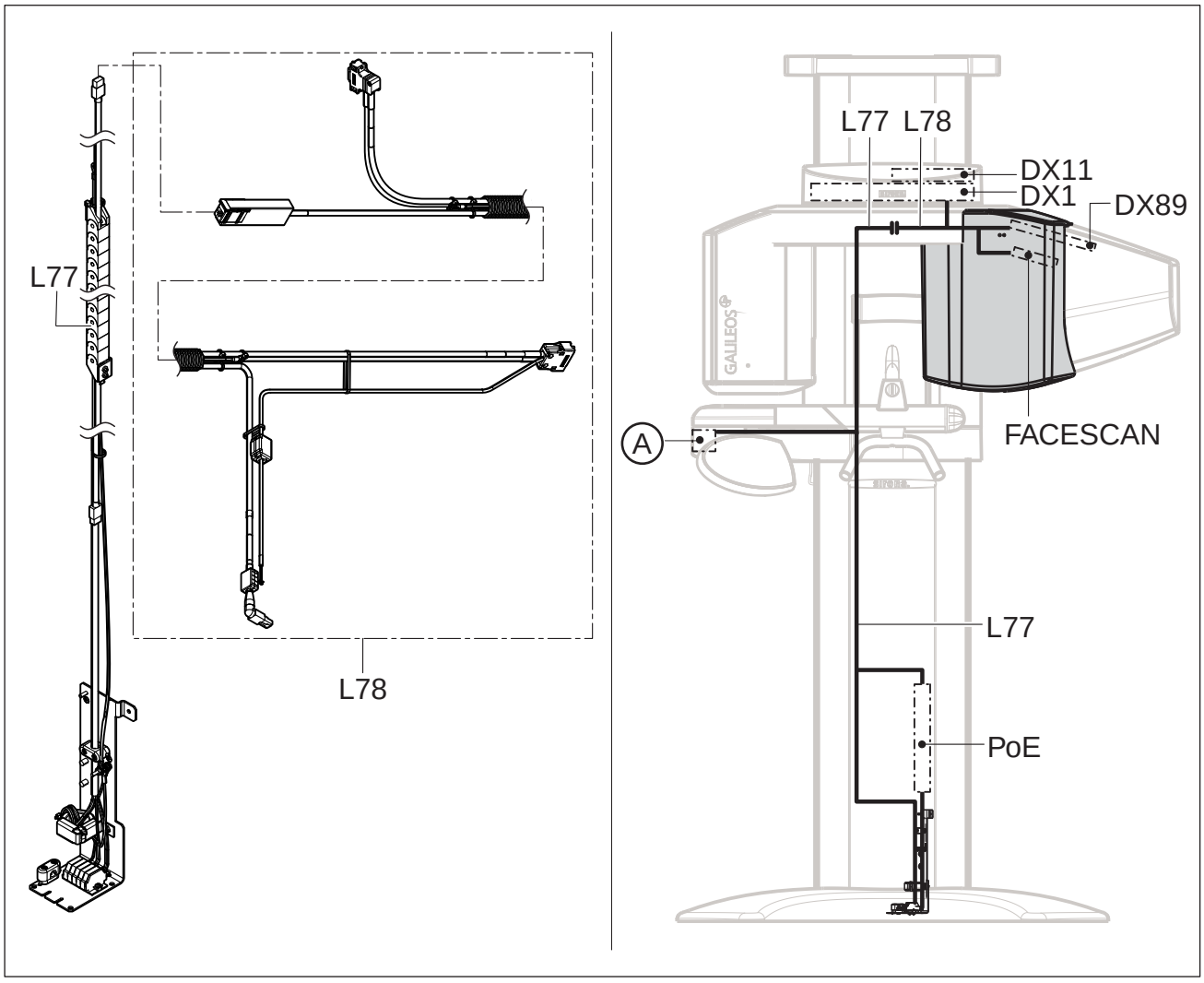
* Cable L28 cannot be replaced.

A	Power switch



E	Media converter

FaceScan cabling

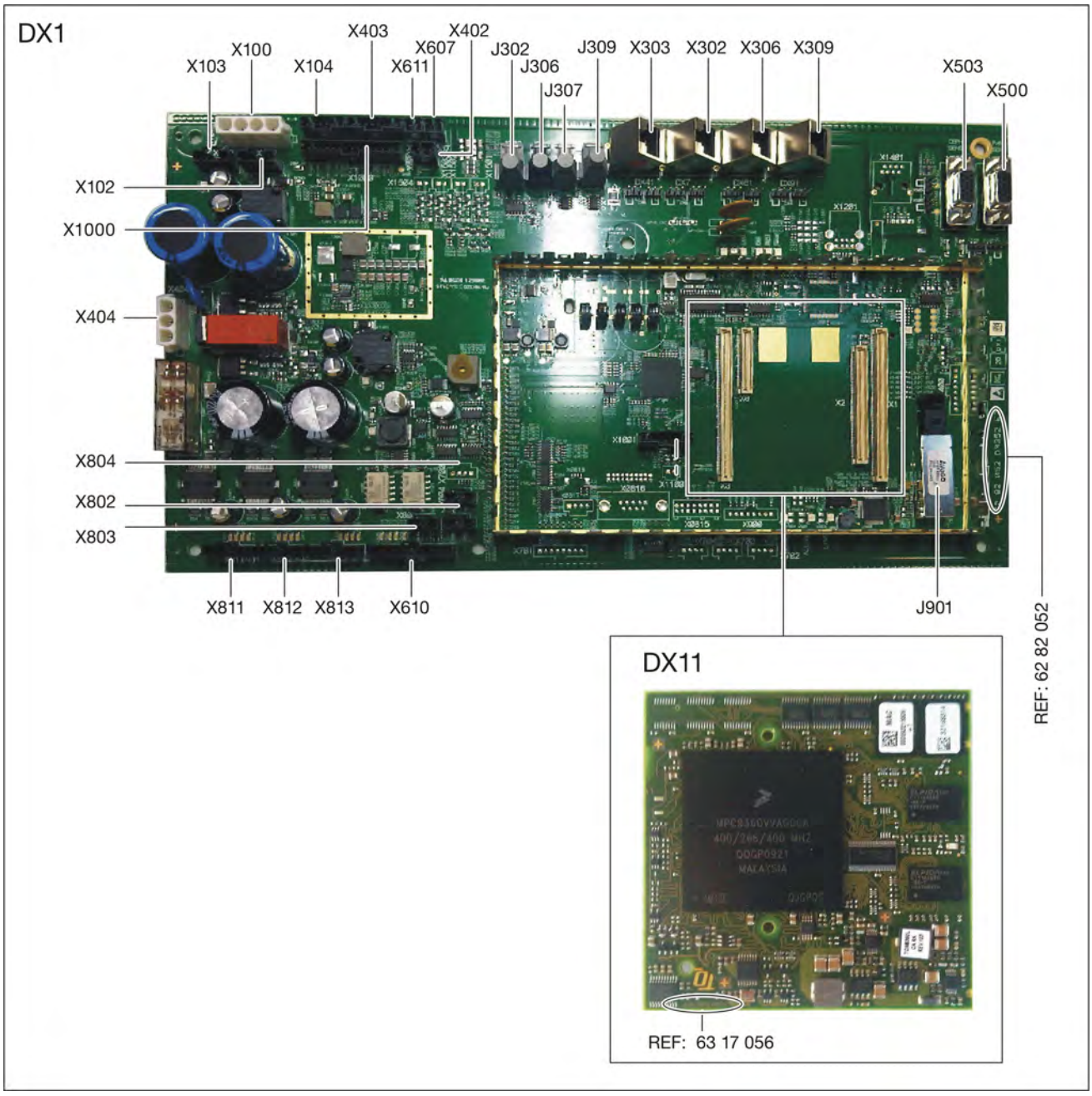


A	Power switch

3.2.5 Board photos

3.2.5.1 Boards in the slide

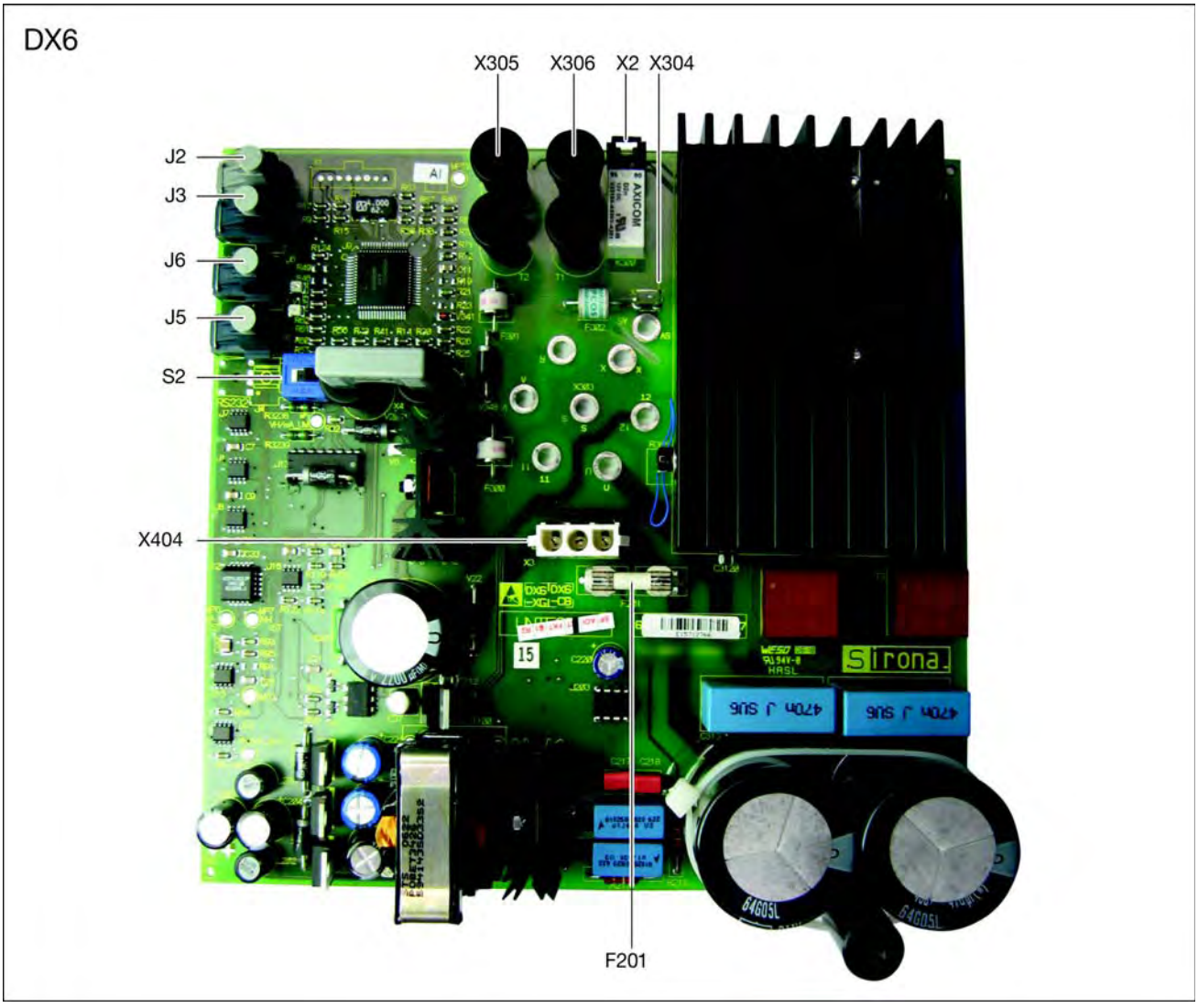
Boards DX1/DX11



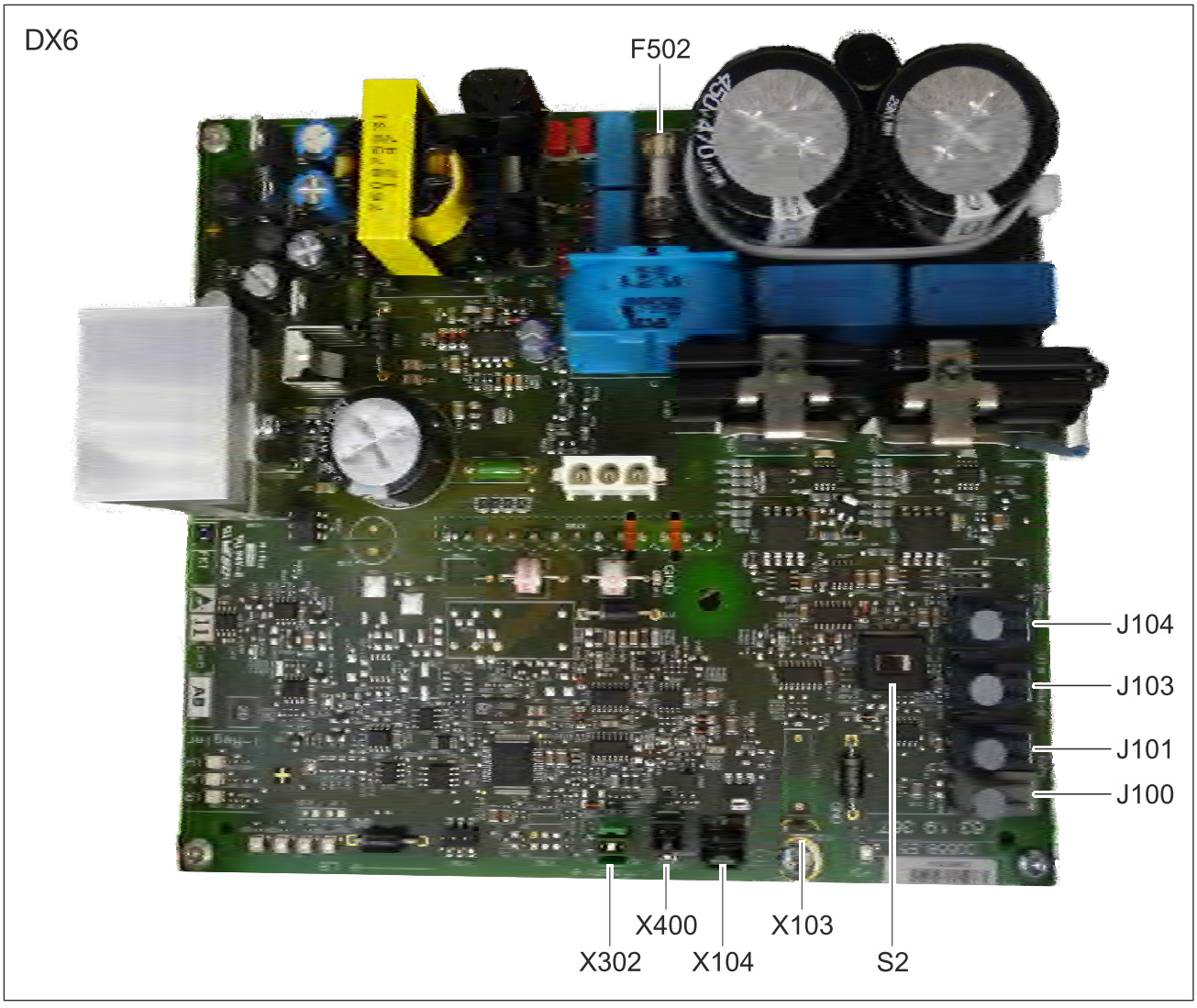
Board DX6

This board is not available as a spare part or a repair part. X-ray tube assemblies can only be ordered as complete units.

GALILEOS Compact and GALILEOS Comfort:



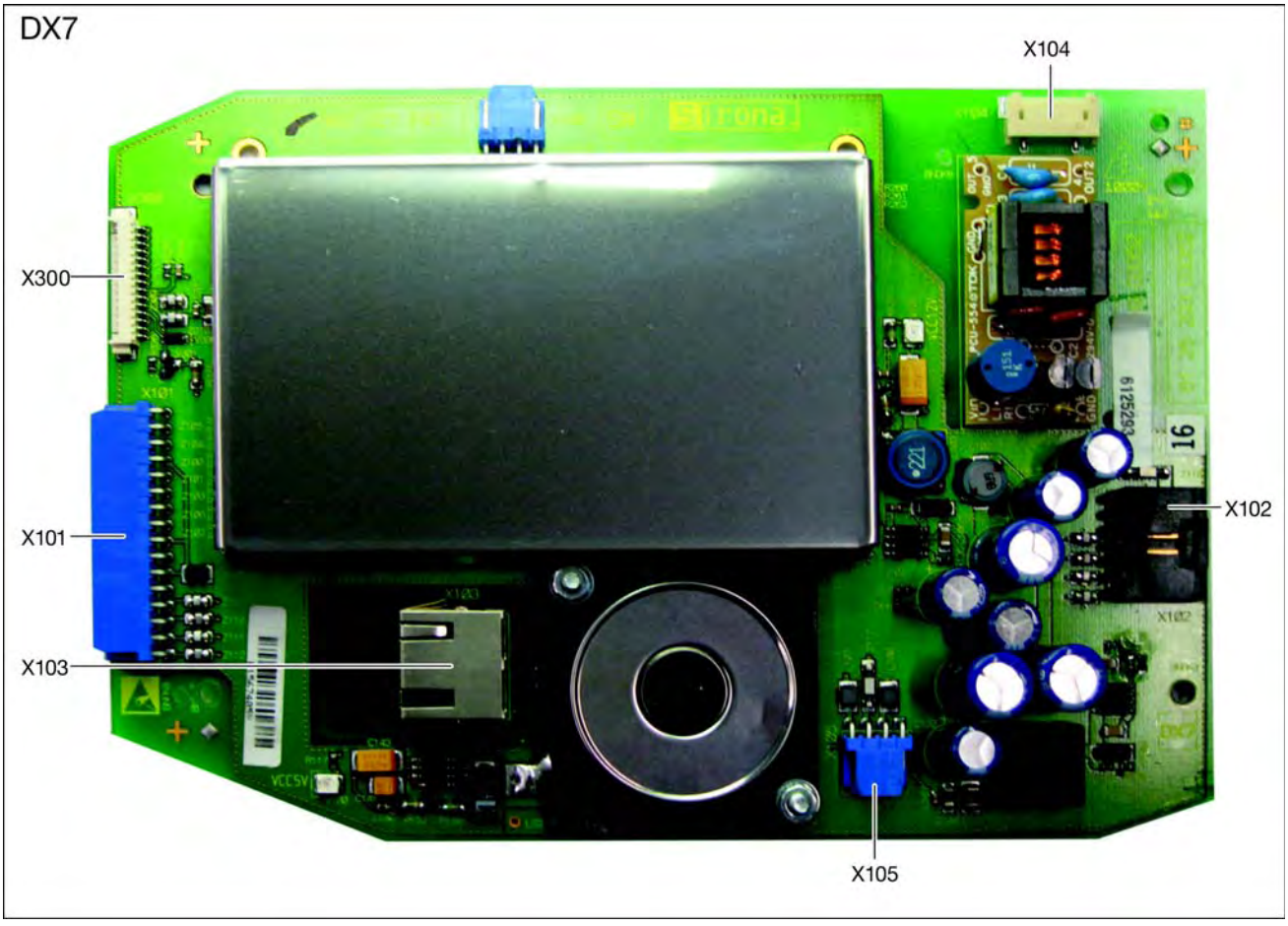
GALILEOS Comfort PLUS:



Board DX7

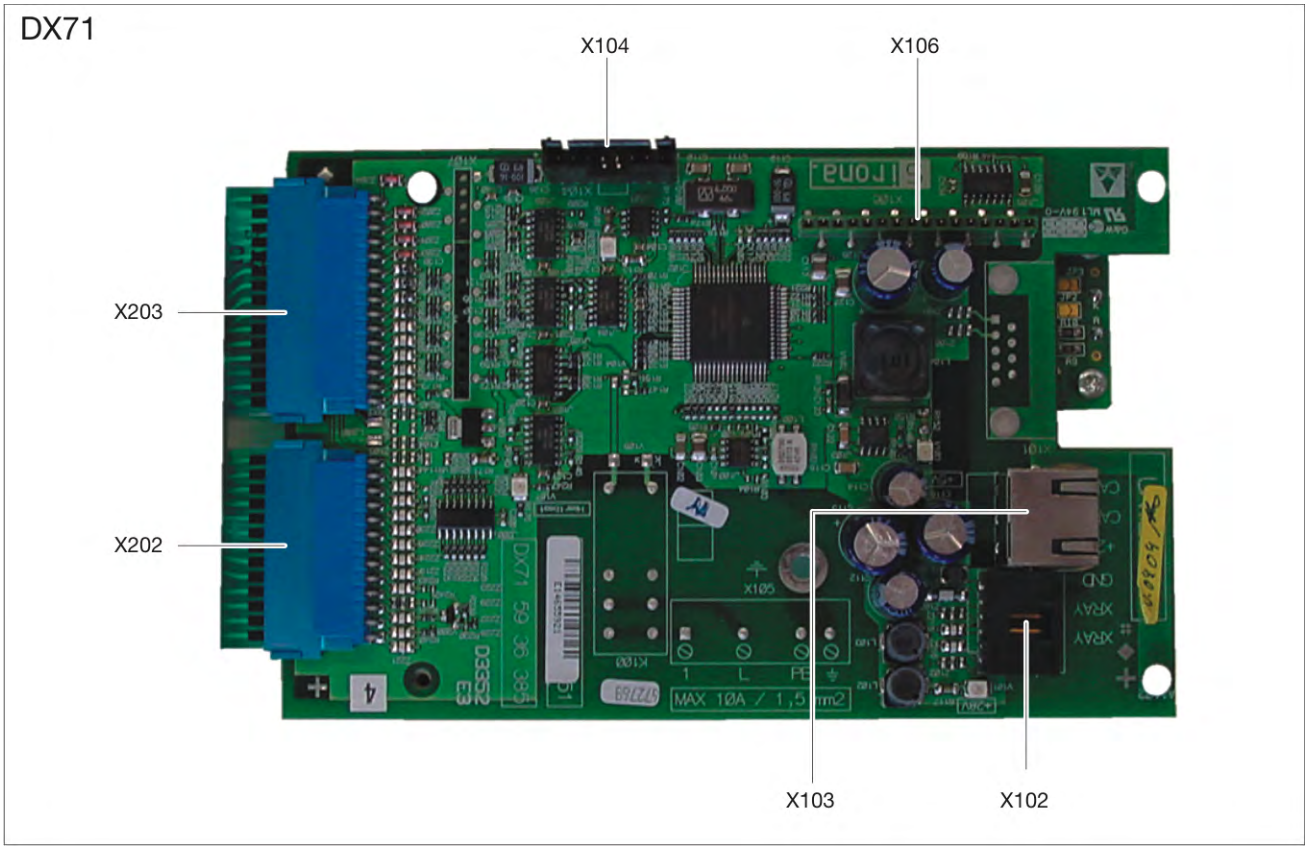
This board is only used in the "GALILEOS Comfort" and the "GALILEOS Comfort^{PLUS}" (not in the "GALILEOS Compact").

The board is not available as a spare part or a repair part. The Easypad can only be ordered as a complete unit.

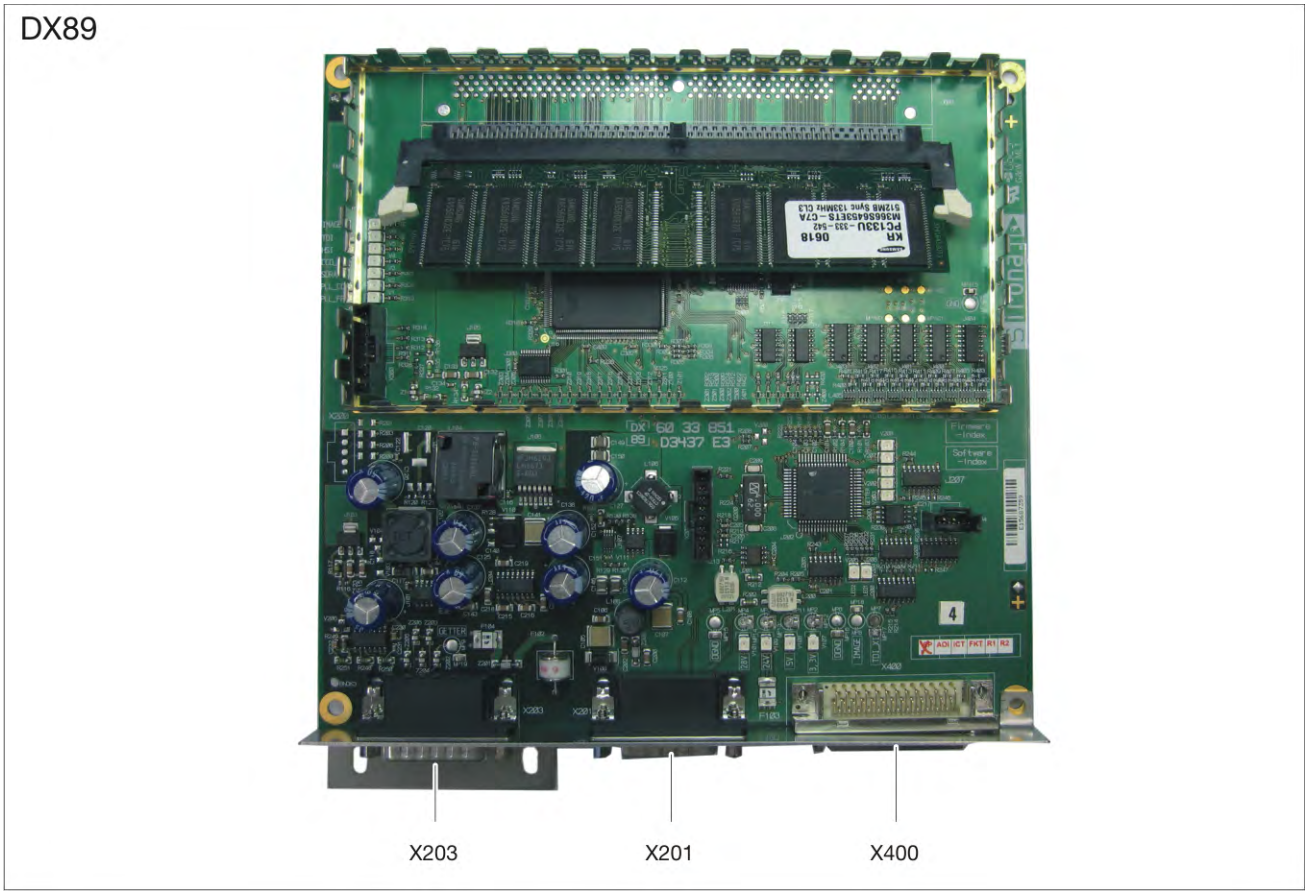


Board DX71

This board is only used in the "GALILEOS Compact" (not in the "GALILEOS Comfort" or the "GALILEOS Comfort^{PLUS}").

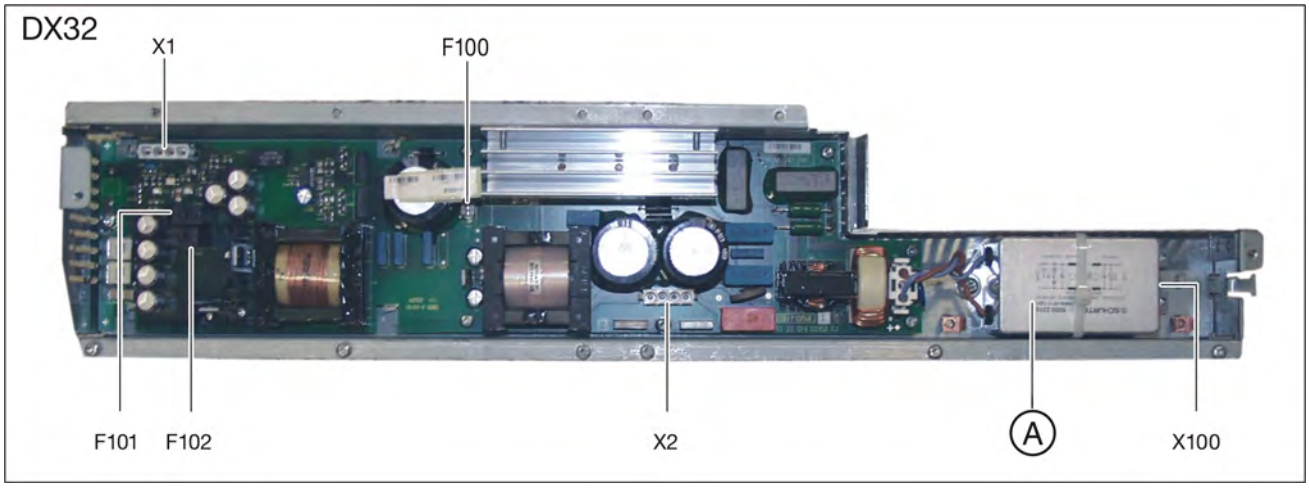

DX71
X104
X106
X203
X202
X103
X102
X105
MAX 10A / 1,5 mm2

Board DX89



3.2.5.2 Boards in the stand

Board DX32

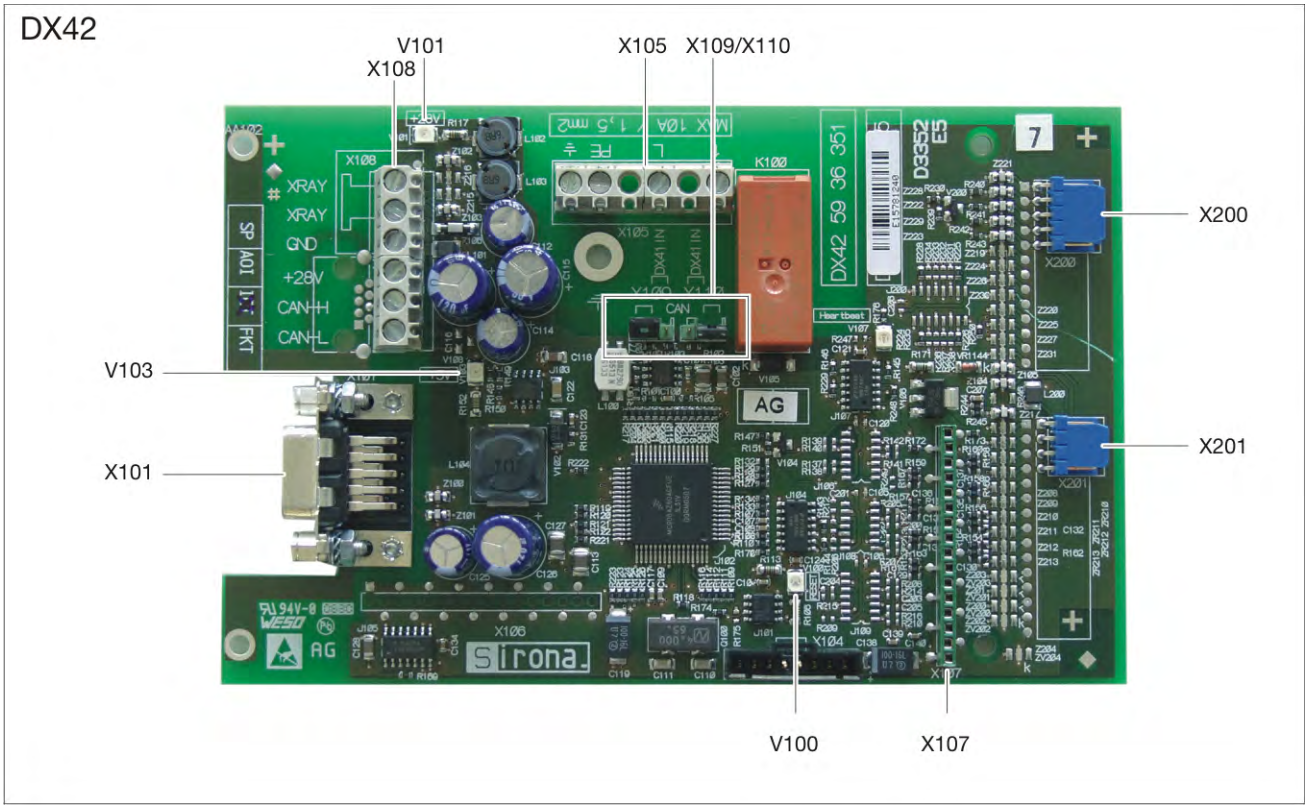


A	Line filter

3.2.5.3 Board in the remote control

Board DX42

This board is not available as a spare part or a repair part.

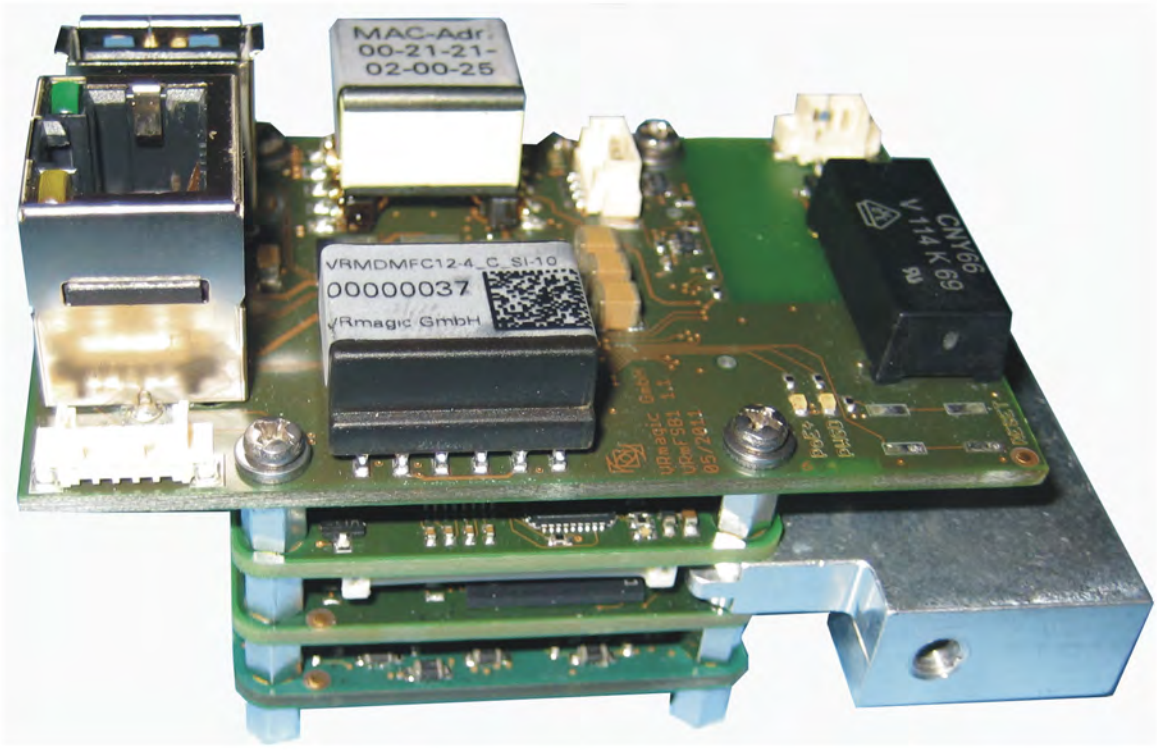


3.2.5.4 FaceScan boards

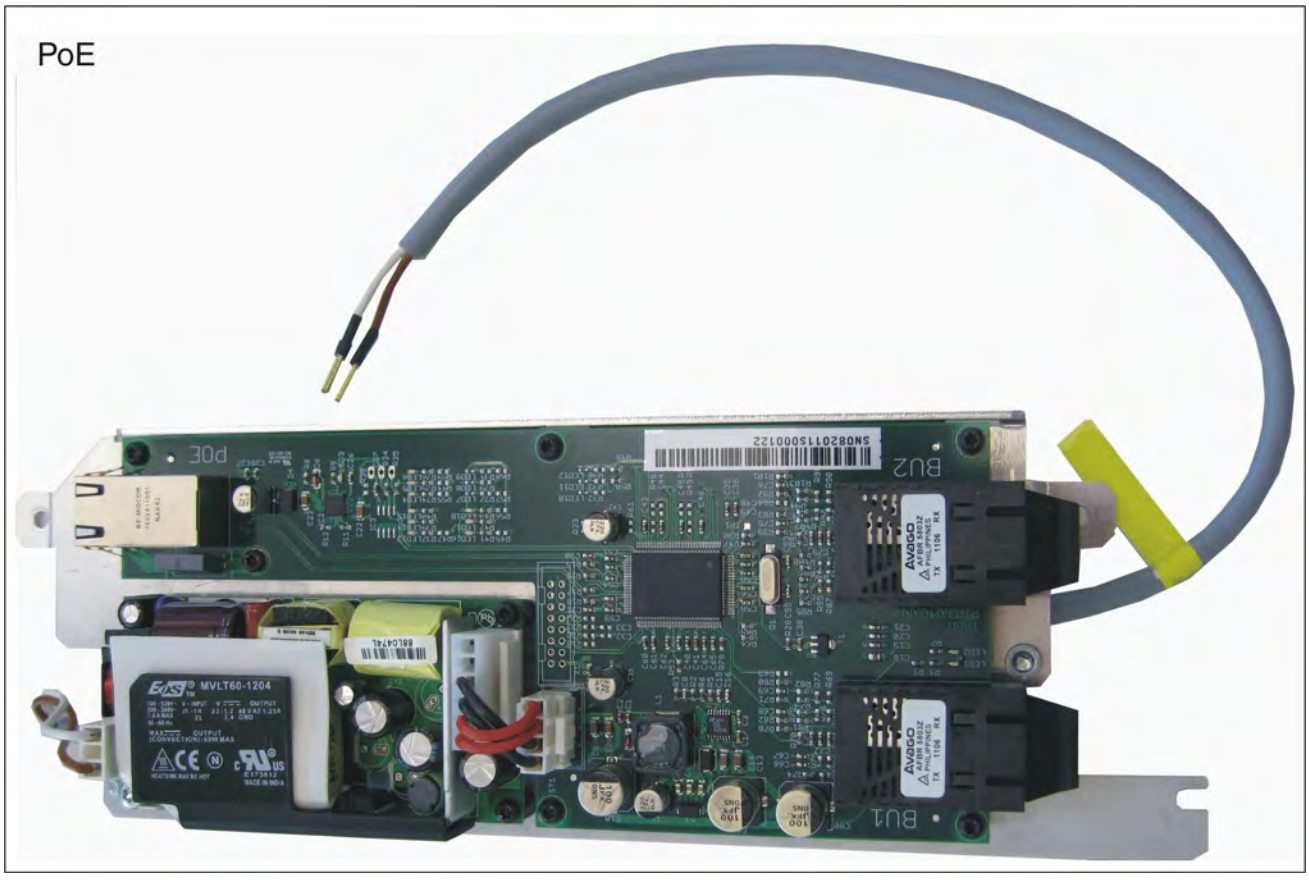
FACESCAN modular board

This modular board is not available as a spare part or a repair part.
FaceScan can only be ordered as a complete unit.

FACESCAN


MAC-Adr.
00-21-21-
02-00-25
VRMDMFC12-4_C_SI-10
00000037
VRmagic GmbH
CNY66
V 114 K 69

PoE power supply board



3.2.6 Covers

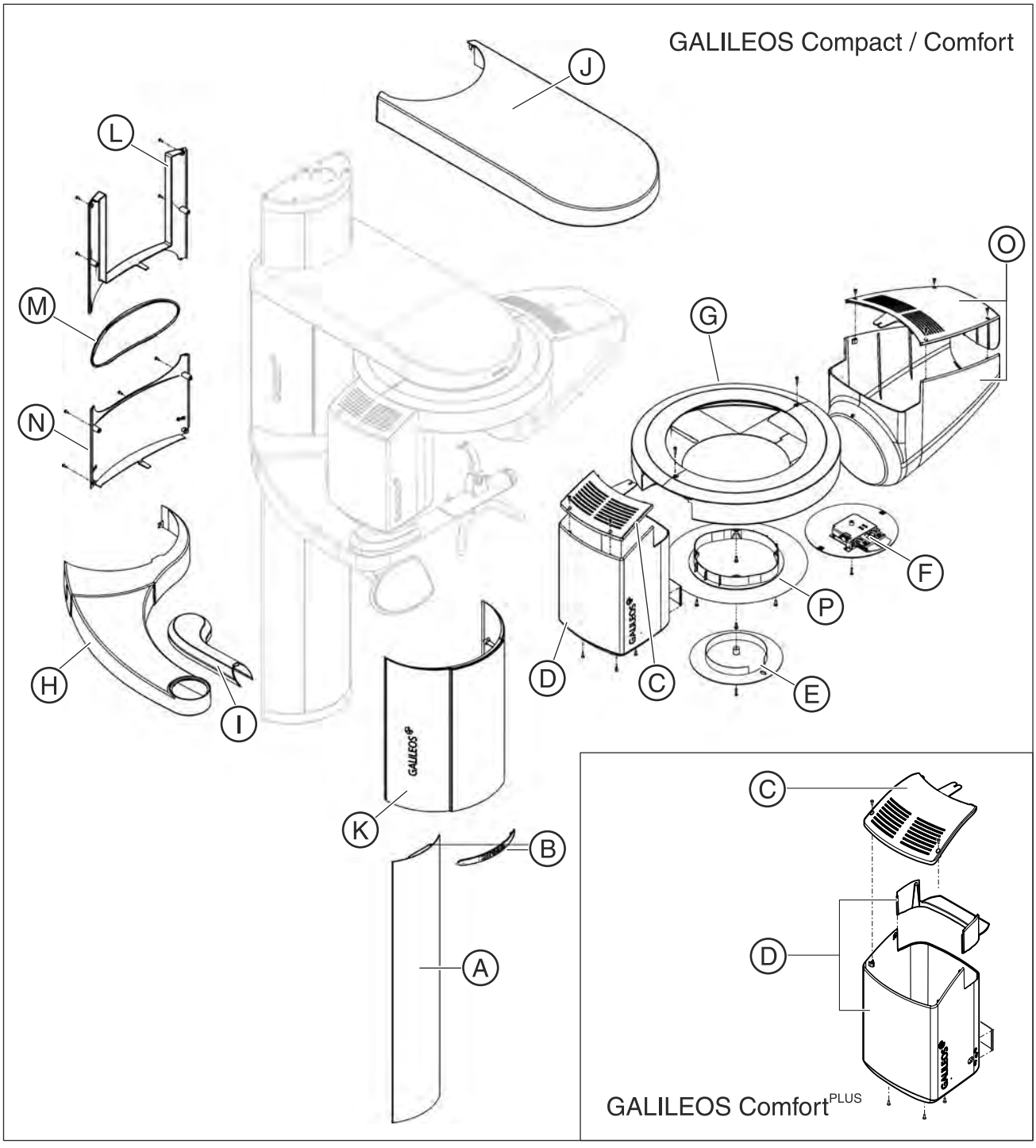
When removing covers, always remember that direct sunlight or bright room lighting can cause system malfunctions due to activated light barriers. Therefore: avoid direct sunlight and bright room lighting above the unit!

Reattach all covers. When attaching the covers: be sure to screw the sheet metal cover back on.

IMPORTANT: For reasons of electromagnetic compatibility, be sure to fasten all screws.

GALILEOS

IMPORTANT
The covers of your unit may differ slightly from those shown in the following illustration, depending on the unit class/unit serial number.



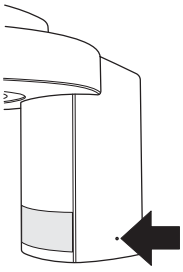
A	Profile covers, top and bottom
B	Intermediate piece
C	Tube assembly cover, rear
P	Tube assembly cover
E	Cover for ring center (in units without head fixation device)

F	Acquisition unit for head fixation device (in units with head fixation device)
G	Ring cover
H	Support cover
I	Swivel arm cover
J	Arm cover
K	Slide cover, front
L	Slide cover, top rear
A	Slide cover, center rear
N	Slide cover, bottom rear
O	X-ray detector cover

3.2.7 Technical data

3.2.7.1 GALILEOS Compact/GALILEOS Comfort

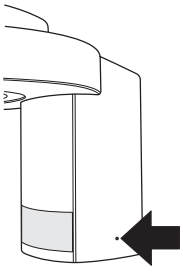
Chassis:	Model designation	GALILEOS Compact/Comfort
	Nominal voltage:	200 V – 240 V
	Permissible fluctuation:	±10%
	Permissible drop under load:	10%
	Rated current:	6 A
	Nominal power output:	0.6 kW at 85 kV/7 mA
	Current time product:	42 mAs
	Nominal frequency:	50 Hz / 60 Hz
	Internal line impedance:	max. 0.8 ohms
	Main building fuse:	25 A slow-blow (16 A for single line)
	Power consumption:	0.9 kVA
X-ray tube assembly:	Focal spot size acc. to IEC 60336, measured in the central X-ray beam:	0.5
	kV:	85 kV
	mA:	5 mA / 7 mA
	Pulsed mode:	10 ms – 30 ms
	Total filtration of X-ray tube assembly	> 2.5 Al / 90 IEC 60522
	Integrated filter:	0.4 mm Cu
	Cone-beam angle:	collimated to approx. 24°
	High voltage generation frequency:	80 kHz – 100 kHz
Detector:	Type:	Image intensifier (I.I.), Thales or Siemens
	Active input window size:	215 mm (8 1/2") diameter
	Camera:	Pixels: 1000^2

		FPS: 15 – 30 Dynamics: 12 bits, (4096 brightness values), 60 dB
Geometry:	Source-I.I. converter coating distance (central X-ray beam)	510 mm (20 1/16")
	Source-isocenter distance (central X-ray beam)	333 mm (13 1/8")
	Source-skin distance (minimum distance)	approx. 220 mm (8 5/8")
Scanning process:	Orbital angle	204°
	Scan time	approx. 14 s
	Number of single exposures	200
Reconstruction:		
	Marking of focal spot:	
	Automatic exposure blocking:	The duration of automatic exposure blocking (cooling period) depends on the set kV/mA level and the actual exposure time. Depending on the tube load, interval times of 8 s to 300 s are automatically set by the system.
	Class I device Degree of protection against electric shock:	 Type B device
	Degree of protection against ingress of water:	Ordinary equipment (without protection against ingress of water)
	Year of manufacture:	20XX (on the rating plate)
	Operating mode:	Continuous operation
	Long-term power output:	100 W
	Anode material:	Tungsten
	Exposure parameters for determining leakage radiation:	7 mA / 85 kV
	Continuing current for leakage radiation measurements:	0.14 mA
	Transport and storage temperature:	
	Basic unit	-40° C – +70° C (-40° F – 158° F)

	Detector	-30°C – +55°C (-22°F – 131°F)
	Air humidity:	10% – 95% without condensation
	Admissible operating temperature:	from +10°C to +35°C (50°F – 95°F)
	Operating altitude:	≤ 3000 m
X-ray tube:	Toshiba DF-151R or Siemens SR 120/15/60	
Minimum requirements for reconstruction PC (included in the scope of supply):	Processor:	DualCore from 2 GHz
	RAM:	4 GB RAM
	Hard disks:	> 500 GB
	Operating system:	Windows XP Professional SP3 or Windows 7 Professional
	External drive:	1x DVD-ROM, dual-layer
Minimum requirements for SIDEXIS visualization PC (not included in the scope of supply):	See SIDEXIS XG Operator's Manual. The system requirements are also listed under www.sidexis.com	
Network:	Network:	100 MB Ethernet, 1 Gbit Ethernet recommended
	Communication interface:	RJ45 for LAN cable

3.2.7.2 GALILEOS Comfort PLUS

Chassis:	Model designation	GALILEOS Comfort^{PLUS}
	Nominal voltage:	200 V – 240 V
	Permissible fluctuation:	±10%
	Permissible drop under load:	10%
	Rated current:	6 A
	Nominal power output:	0.6 kW at 98 kV/6mA
	Current time product:	30 mAs
	Nominal frequency:	50 Hz / 60 Hz
	Internal line impedance:	max. 0.8 ohms
	Main building fuse:	25 A slow-blow (16 A for single line)
	Power consumption:	0.9 kVA
X-ray tube assembly:	Focal spot size acc. to IEC 60336, measured in the central X-ray beam:	0.5
	kV:	98 kV
	mA:	3 mA - 6 mA
	Pulsed mode:	10 ms – 14 ms

	min. permanent filtering: min. half-value layer:	2.8 mm Al / 98 IEC 60522 3.9 mm Al
	Integrated filter:	0.2 mm Cu
	Cone-beam angle:	collimated to approx. 24°
	High voltage generation frequency:	80 kHz – 100 kHz
Detector:	Type:	Image intensifier (I.I.), Siemens
	Active input window size:	215 mm (8 1/2") diameter
	Camera:	Pixels: 1000^2 FPS: 15 – 30 Dynamics: 12 bits, (4096 brightness values), 63 dB
Geometry:	Source-I.I. converter coating distance (central X-ray beam)	590 mm (23 1/4")
	Source-isocenter distance (central X-ray beam)	413 mm (16 1/4")
	Source-skin distance (minimum distance)	approx. 300 mm (11 13/16")
Scanning process:	Orbital angle	204°
	Scan time	approx. 14 s
	Number of single exposures	200 HD mode 357
Reconstruction:		
	Marking of focal spot:	
	Automatic exposure blocking:	The duration of automatic exposure blocking (cooling period) depends on the set kV/mA level and the actual exposure time. Depending on the tube load, interval times of 8 s to 300 s are automatically set by the system.
	Class I device Degree of protection against electric shock:	 Type B device
	Degree of protection against ingress of water:	Ordinary equipment (without protection against ingress of water)

	Year of manufacture:	20XX (on the rating plate)
	Operating mode:	Continuous operation
	Long-term power output:	100 W
	Anode material:	Tungsten
	Exposure parameters for determining leakage radiation:	6 mA / 98 kV
	Continuing current for leakage radiation measurements:	0.14 mA
	Transport and storage temperature:	
	Basic unit	-40° C – +70° C (-40°F – 158°F)
	Detector	-30° C – +55° C (-22°F – 131°F)
	Air humidity:	10% – 95% without condensation
	Admissible operating temperature:	between +10°C and +35°C (50°F – 95°F) At a room temperature of > 35°C (> 95°F), Sirona recommends using an air conditioning system.
	Operating altitude:	≤ 3000 m
X-ray tube:	Siemens SR 120/15/60	
Minimum requirements for reconstruction PC (included in the scope of supply):	Processor:	QuadCore Intel i5
	RAM:	8 GB RAM
	Hard disks:	1 TByte
	Operating system:	Windows 7 64-bit (mandatory)
	External drive:	1x DVD-ROM, dual-layer
	Graphics card:	explicit (not onboard), at least 1 GB RAM
Minimum requirements for SIDEXIS visualization PC (not included in the scope of supply):	See SIDEXIS XG Operator's Manual. The system requirements are also listed under www.sidexis.com	
Network:	Network:	100 MB Ethernet, 1 Gbit Ethernet recommended
	Communication interface:	RJ45 for LAN cable

3.3 Software/compatibility

3.3.1 GALILEOS firmware

Any software combinations other than those listed here are not allowed. If a module software version does not match the main software version, the main software version is identified with an asterisk on the info screen (e.g. 04.12.00*).

Main software V04.12.00

GALILEOS		Remote control	
Board	Software	Board	Software
DX6	03.07.04	DX42	02.56.04
DX6NG	04.09.00		
DX7	02.80.07		
DX7-L0	02.29.00		
DX7-L1	02.29.00		
DX7-L2	02.27.00		
DX7-L3	02.27.00		
DX7-L4	02.04.00		
DX7-L5	02.02.00		
DX71	02.54.03		
DX11	04.12.00		
DX11-FPGA	01.04.00		
DX89	01.59.02		
DX89 FPGA	01.58.00		

SIDEXIS XG	GALILEOS software	RCU server software	GALILEOS Implant	FaceScan unit software	FaceScan PC software	FaceScan USB stick
V2.5.6 or higher	V2.0	V2.3	V1.9SP1	V1.15.369–V1.14369	V1.2	FS0004

Main software V04.14.00

GALILEOS		Remote control	
Board	Software	Board	Software
DX6	03.08.00	DX42	02.58.02
DX6NG	04.09.07		
DX7	02.82.01		
DX7-L0	02.31.00		
DX7-L1	02.31.00		
DX7-L2	02.29.00		
DX7-L3	02.29.00		
DX7-L4	02.06.00		
DX7-L5	02.02.00		
DX71	02.55.02		
DX11	04.14.00		

GALILEOS		Remote control	
Board	Software	Board	Software
DX11-FPGA	01.04.00		
DX89	01.60.02		
DX89 FPGA	01.58.00		

SIDEXIS XG	GALILEOS software	RCU server software	GALILEOS Implant	FaceScan unit software	FaceScan PC software	FaceScan USB stick
V2.5.6 or higher	V2.1	V2.4	V1.9 SP1	V1.15.369 – V1.14369	V1.2	FS0004

3.3.2 FaceScan firmware

FaceScan	GALILEOS main unit software	GALILEOS Software	SIDEXIS XG
FS 0004 or higher	V04.12.00 or higher	V2.0 or higher	V2.5.6 or higher

3.3.3 GALILEOS Software

GALILEOS Software	CD index	Remarks
V2.0	006	Requires main unit software V 04.12.00 or higher and SIDEXIS 2.5.6 or higher.

4 General operating procedures

4.1 Switching the unit on

⚠ WARNING

X-rays

Be sure to observe the radiation protection regulations applicable in your country.

➢ No person may be positioned in the unit when it is switched on.

NOTICE

Damage to the unit

Check the room height before you raise the unit.

➢ If the room height is less than 2.27 m (89 3/8") or 2.30 m (90 1/2") for installation with the floor stand, you must limit the maximum travel height [→ 232].

NOTICE

Fluctuations in temperature can cause condensation to form in the unit.

Electrical components are destroyed by short circuits.

➢ Do not switch the unit on until the temperature of the unit has adapted to the ambient temperature and the condensation has evaporated.

NOTICE

The unit must not be switched on/off constantly.

Constant switching on and off reduces the service life of individual unit components and results in increased power consumption.

➢ After switching the unit off, wait for approx. 60 seconds before switching it on again.

4.1.1 Switching the "GALILEOS Comfort / Comfort PLUS" on

NOTICE

The surface of the touchscreen is sensitive.

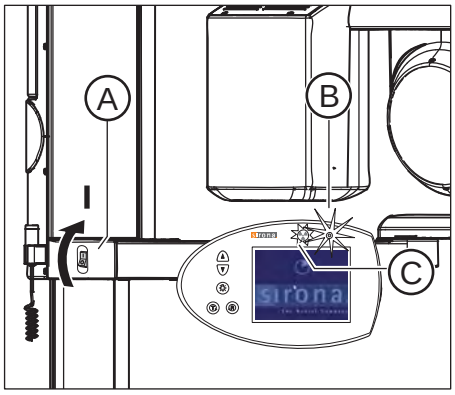
The touchscreen can be damaged or its surface scratched.

➢ Never use pointed objects such as ballpoint pens, pencils, etc. to operate the touchscreen.

➢ Only use your fingertips to operate the touchscreen.

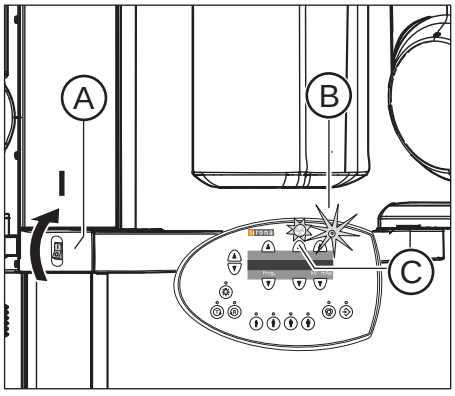
IMPORTANT

After the unit is switched on, the touchscreen has only limited readability for several minutes until the background lighting has completed its warm-up phase.
After the unit is switched off with the main switch, the touchscreen remains lit for approx. another 3 to 5 seconds.



1. Turn the main switch (**A**) to position **I**.
2. Wait for approx. 1 minute.
   - The X-ray radiation indicator (**B**) lights up for approx. 1 second as a functional check.
   - After approx. 2 seconds, the green LED (**C**) in the upper part of the control panel lights up. This LED remains lit as long as the unit is on.
   - The start screen is displayed on the touchscreen for several seconds.
   - The program selection is then displayed on the touchscreen.
3. Check whether the patient symbols on the touchscreen can be selected in exactly the right position.
   If problems occur during selection, adjust the touchscreen.
4. Press the R key.
   - The unit moves to its starting position.
5. Switch on the PC.
6. Start SIDEXIS XG.
   - As long as no connection has been made to SIDEXIS XG, the message is displayed in the comment line of the control panel on the *"Switch SIDEXIS to ready for exposure state"* touchscreen.

4.1.2 Switching the "GALILEOS Compact" on



1. Turn the main switch (**A**) to position **I**.
2. Wait for approx. 1 minute.
   - The X-ray radiation indicator (**B**) lights up for approx. 1 second as a functional check.
   - After approx. 2 seconds, the green LED (**C**) in the upper part of the control panel lights up. This LED remains lit as long as the unit is on.
3. Press the R key.
   - The unit moves to its starting position.
4. Switch on the PC.
5. Start SIDEXIS XG.
   - Help message H401 remains displayed on the Multipad as long as there is no connection with SIDEXIS XG.

4.1.3 Factory setting after switch-on

The unit has the following factory configuration on delivery:

- Start settings:
  - Starting position: from the front (right)
  - VO4 (for "GALILEOS Compact")
  - VO1 (for "GALILEOS Comfort")
  - VO5 (for "GALILEOS Comfort^{PLUS}")
  - Patient symbol 2: 85 kV/21 mAs
- The acoustic signal for end of exposure is activated.

Only for "GALILEOS Comfort" and "GALILEOS Comfort^{PLUS}":

- The unit language is preconfigured as ordered.
- The welcome screen is switched on.
- The first name, last name and date of birth lines are displayed on the welcome screen.
- For GALILEOS Comfort^{PLUS}: HD mode is enabled.

If the customer requires a different configuration, this can be implemented via service routine S017.

4.2 Updating the firmware

4.2.1 Updating the unit firmware

IMPORTANT

Downgrading to older versions

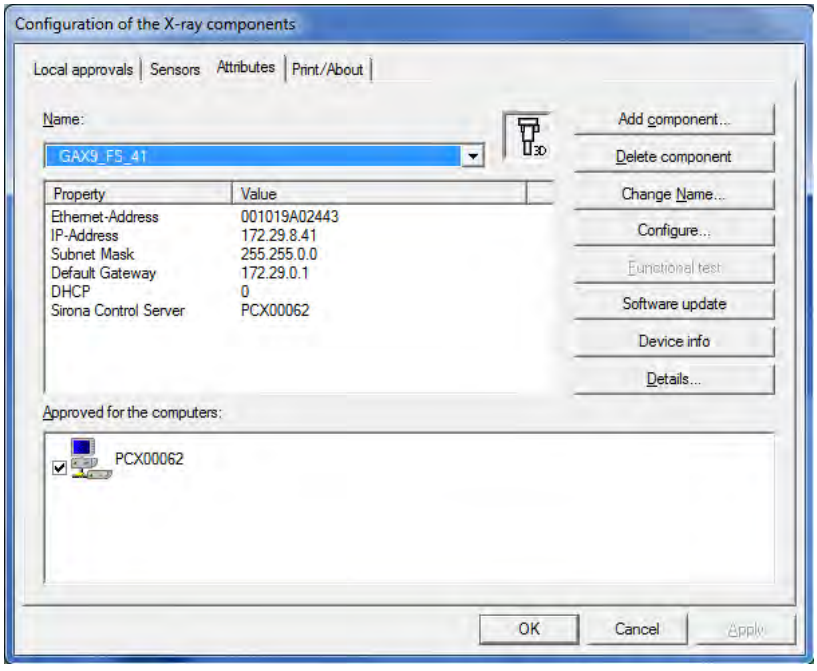
Downgrading the unit software version V04.14.00 or higher to an older version is not a simple process. However, if this is essential, please get in contact with the SIRONA Customer Service Center (CSC) in advance.

IMPORTANT

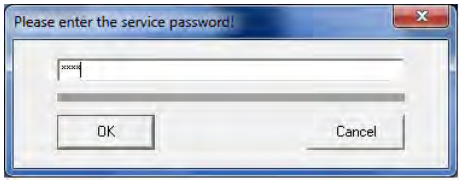
For GALILEOS Compact / Comfort:
For a firmware update to the device from version V03.07.02 or lower to version V04.14.00 or higher, an intermediate update to version V04.07.00 must be performed first.

Also read the information provided on the firmware CD supplied with the unit and on the SIRONA dealer page on the Internet very carefully. These sources always contain the latest information on software updates.

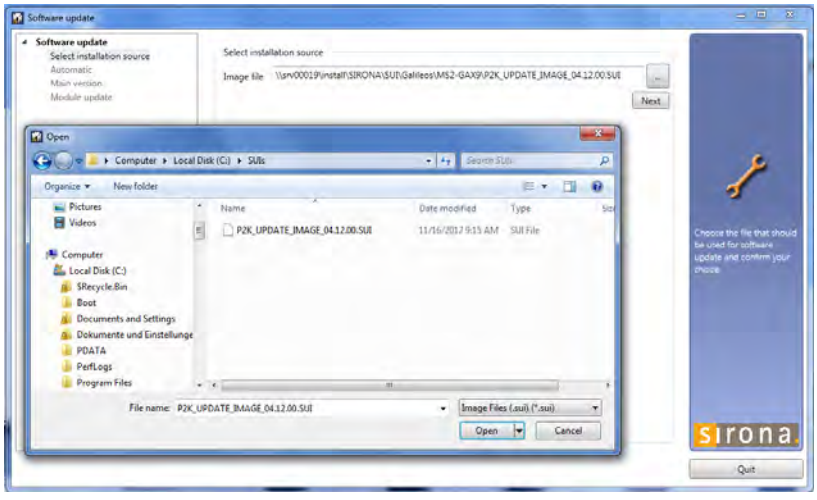
1. Start the *"SIDEXIS Manager"* under "Start"/"Programs"/"SIDEXIS"/ *"SIDEXIS XG"*.
2. Click on *"Configuration of the X-ray components"*.
   ↳ The *"Configuration of the X-ray components"* menu opens.



3. Select the *"Attributes"* tab.
4. Click the *"Software update"* button.
   ↳ The dialog box for entering the service password opens.

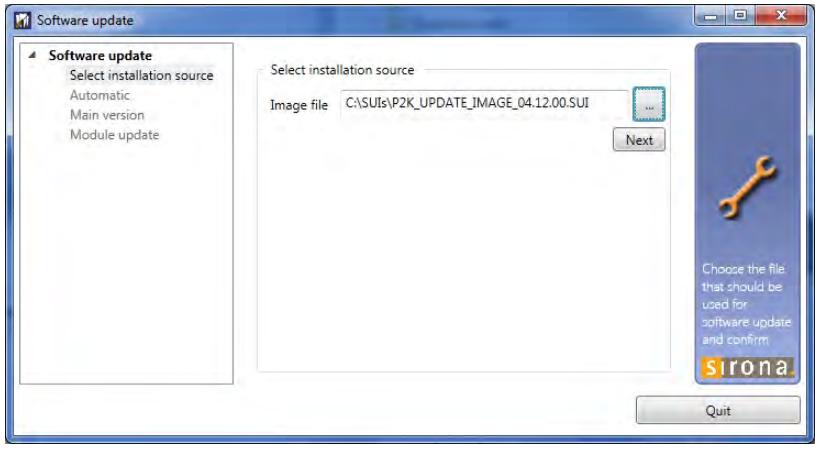


5. Enter the service password.
   Enter the first 4 digits of the current system date in reverse order as the service password (e.g. on 05/24/1995, 5042 must be entered as the service password.
   If an incorrect service password or no password at all is entered, the limited update menu for users will be started. This only supports an automatic update [→ 51] option.
   ↳ The dialog box for selecting the installation source opens.
6. Click on the button with the 3 dots.
   ↳ The dialog box for selecting the update file opens.



7. Select the desired update file from the list and confirm the selection with the *"Open"* button.

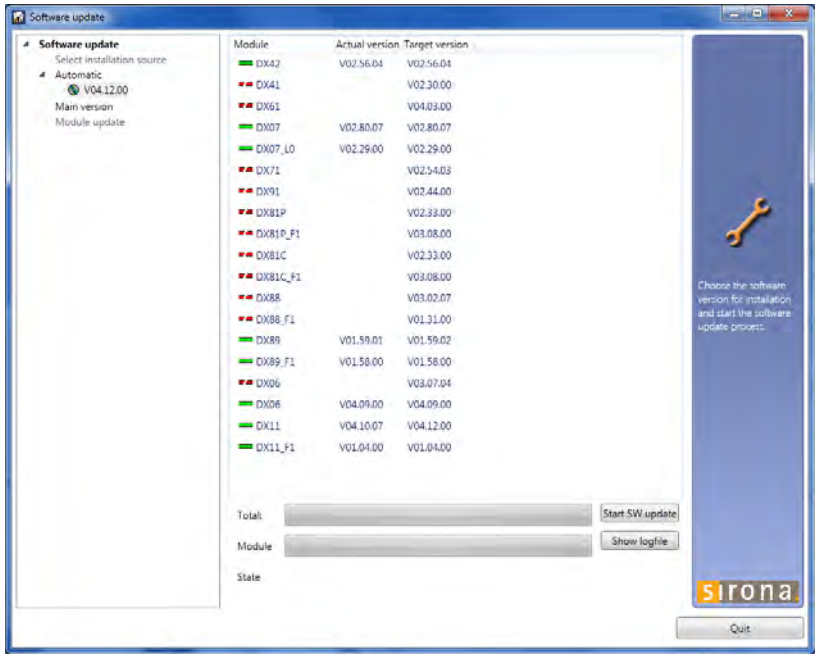
The update file is located on the unit software CD. It is delivered with each DX11 replacement board and also included in the country set. The contents of the CD can be downloaded from the Dealer domain of the SIRONA Internet home page (under Products/Imaging systems): www.sirona.com



8. Click the *"Next"* button.
   - The software manager opens.
   - The action window (**A**) of the software manager displays the modules and their current software versions.
   - In the structure tree on the left (**B**) of the software manager, the update modes *"Automatic"* and *"Main version"* can now be selected.

IMPORTANT

For historical reasons, two versions of module DX6 appear in the action window (**A**) of the software manager. The installed version is indicated by a green bar.



9. Select the desired mode for the software update (see chapter entitled "Update mode [→ 51]").

NOTICE

Unit inoperability!

Before starting the software update, make sure that no unit movements are active. Otherwise the system may become inoperable in rare cases. The X-ray detector must be installed as part of the update. Exposure readiness must be deselected in SIDEXIS XG and the unit must not already be in service mode.

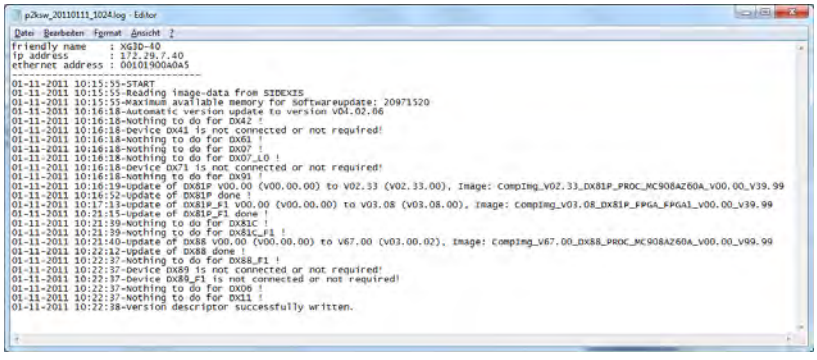
10. Click the *"Start SW update"* button.
    - The update is started. A message box informs you when the update process is completed.
11. Confirm the update by clicking the *"OK"* button.
    - A message in the software manager notifies you that a unit restart is required to activate the software update you performed.

NOTICE

Effectiveness of the software update

The unit must be restarted after every software update. The new DX11 version will not run until the unit has been rebooted (see also chapter "Measures following replacement of boards [→ 306]").
Any errors with the consecutive numbers 01, 03, 04, 06 or 07 displayed immediately following the software update may be ignored. If these messages appear again after the unit is rebooted, perform troubleshooting as described in the section entitled "Error messages [→ 79]".
If anything conspicuous occurs in connection with unit handling on completion of the software update and restart of the unit, please repeat the software update as the first measure.

12. Click on the *"Show logfile"* button and use the log files to check whether the update was successfully performed.
    If it features entries such as "Update of DXxx failed!", please perform the update again. Repeat this procedure as often as necessary until the "failed messages" no longer appear.


p2ksw_20110111_1024.log - Editor
Datei Bearbeiten Format Ansicht ?
friendly name : XG3D-40
ip address : 172.29.7.40
ethernet address : 00101900A0A5
01-11-2011 10:15:55-START
01-11-2011 10:15:55-Reading image-data from SIDEXIS
01-11-2011 10:15:55-Maximum available memory for softwareupdate: 20971520
01-11-2011 10:16:18-Automatic version update to version V04.02.06
01-11-2011 10:16:18-Nothing to do for DX42 !
01-11-2011 10:16:18-Device DX41 is not connected or not required!
01-11-2011 10:16:18-Nothing to do for DX61 !
01-11-2011 10:16:18-Nothing to do for DX07 !
01-11-2011 10:16:18-Nothing to do for DX07_LO !
01-11-2011 10:16:18-Device DX71 is not connected or not required!
01-11-2011 10:16:18-Nothing to do for DX91 !
01-11-2011 10:16:19-Update of DX81P V00.00 (V00.00.00) to V02.33 (V02.33.00), Image: CompImg_V02.33_DX81P_PROC_MC908AZ60A_V00.00_V39.99
01-11-2011 10:16:52-Update of DX81P done !
01-11-2011 10:17:13-Update of DX81P_F1 V00.00 (V00.00.00) to V03.08 (V03.08.00), Image: CompImg_V03.08_DX81P_FPGA_FPGA1_V00.00_V39.99
01-11-2011 10:21:15-Update of DX81P_F1 done !
01-11-2011 10:21:39-Nothing to do for DX81C !
01-11-2011 10:21:39-Nothing to do for DX81C_F1 !
01-11-2011 10:21:40-Update of DX88 V00.00 (V00.00.00) to V67.00 (V03.00.02), Image: CompImg_V67.00_DX88_PROC_MC908AZ60A_V00.00_V99.99
01-11-2011 10:22:12-Update of DX88 done !
01-11-2011 10:22:37-Nothing to do for DX88_F1 !
01-11-2011 10:22:37-Device DX89 is not connected or not required!
01-11-2011 10:22:37-Device DX89_F1 is not connected or not required!
01-11-2011 10:22:37-Nothing to do for DX00 !
01-11-2011 10:22:37-Nothing to do for DX11 !
01-11-2011 10:22:38-Version descriptor successfully written.

13. Restart the unit now.
14. Use the software manager or the service routine S008.2 (see chapter entitled "Unit software versions and compatibility") to check whether all modules have been updated to the latest release of the program

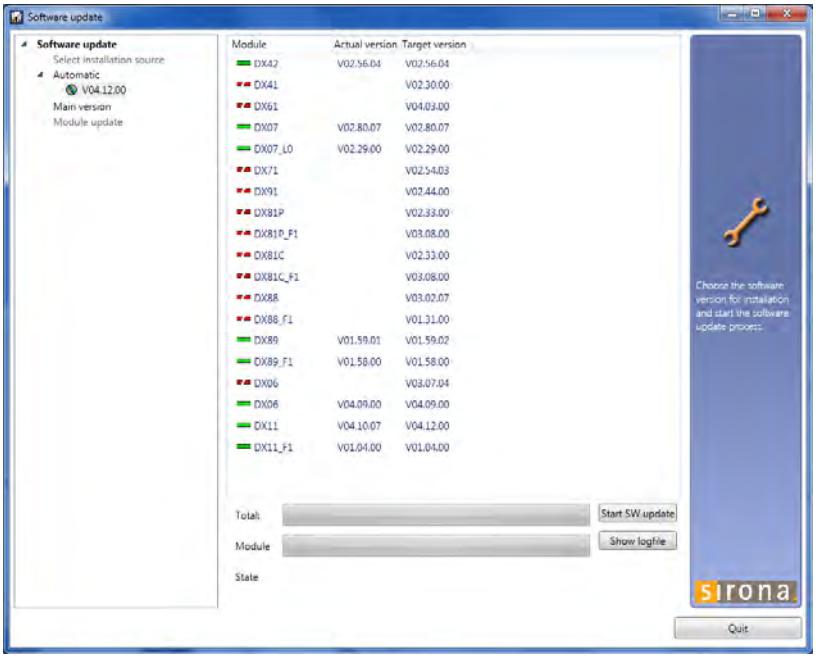
(see chapter entitled "Check program releases [→ 53]".

15. Call up "Further Details".
This generates an XML file (with the system parameters) which is Filed in the PDATA/.../P2K_Config directory under the network name of the unit.

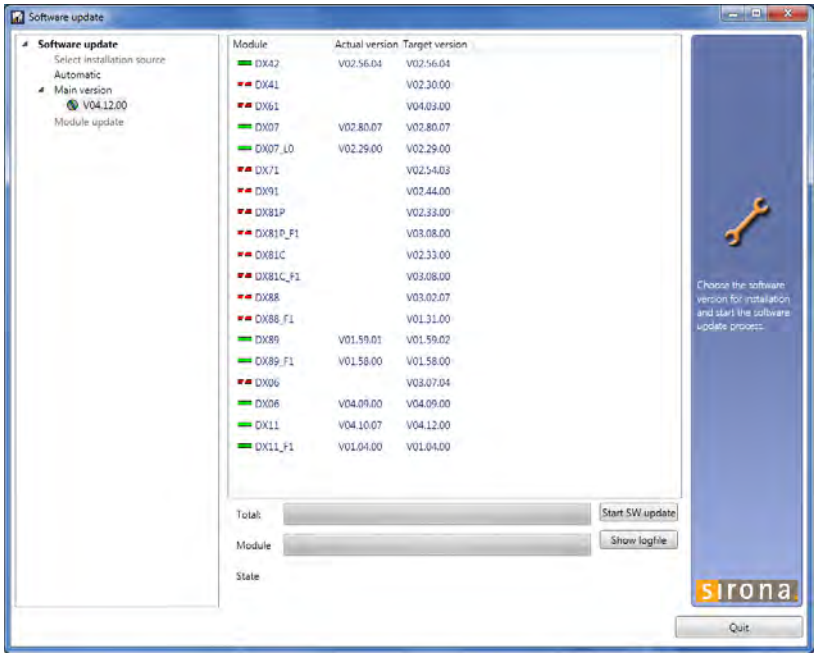
4.2.1.1 Update mode

IMPORTANT
Update mode Module update is only intended for internal Sirona purposes and is not activated for User or Service mode.

In *Service mode* (accessible only by entering the Service Password [→ 148]), the update manager supports two modes for updating the software; these can be selected via the elements *"Automatic"* and *"Main version"* in the structure tree:



- **Automatic**
The software of all components is automatically *updated to the latest software version*.
The right window displays a list of the modules, their installed software version and the latest software version offered by the update.

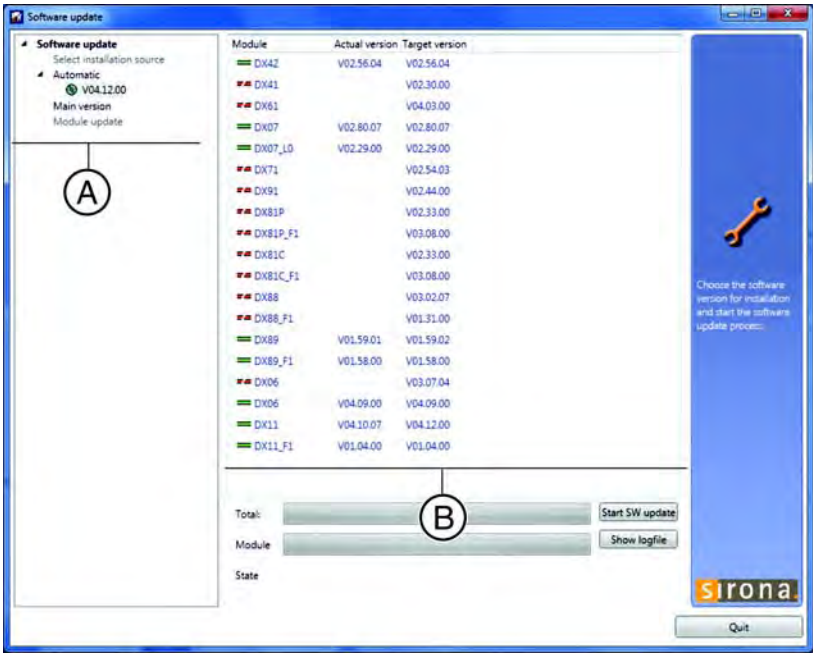


- **Main version**
  The software can be updated or downgraded using this menu. This update mode is required, among other things, if a replacement module arrives from the warehouse and features a newer release than the existing main release of the unit. In this case, a main version update to the overall unit status (displayed on the info screen) must be performed for the corresponding component with the appropriate update file (*.SUI). The module is then reprogrammed.

In *User mode* (which can be accessed without a service password), the update manager only supports *"Automatic"* update mode.

The colored bars in front of the software releases indicate their validity (see chapter entitled "Check program releases [→ 53]").

4.2.1.2 Check program releases



You can use the action window (**A**) of the software manager to check which modules are connected to the unit and what their latest program release is.

Baugruppe	Ist Version	Soll Version
DX42	V02.56.04	V02.56.04
DX41		V02.30.00
DX61		V04.03.00
DX07	V02.80.07	V02.80.07
DX07_L0	V02.29.00	V02.29.00
DX71		V02.54.03
DX91		V02.44.00
DX81P		V02.33.00
DX81P_F1		V03.08.00
DX81C		V02.33.00
DX81C_F1		V03.08.00
DX88		V03.02.07
DX88_F1		V01.31.00
DX89	V01.59.01	V01.59.02
DX89_F1	V01.58.00	V01.58.00
DX06		V03.07.04
DX06	V04.09.00	V04.09.00
DX11	V04.10.07	V04.12.00
DX11_F1	V01.04.00	V01.04.00

Modules which are connected and whose program release corresponds to the latest main software version (see chapter entitled "Unit software versions and compatibility" are identified by a continuous green bar.

Modules which the system does not recognize are identified by a broken red bar.

If the actual status of the module cannot be polled for the update, the actual SW version will be displayed as = V00:00.

If a module has a hardware incompatibility to the program status to be programmed or the software version on the module is newer than the one in the update file, this will be indicated by a red triangle with an exclamation mark.

If the version of the selected update file is lower than the current software version of the unit, then there will be no display in the right window. The downgrade required in this case is possible only via *"Main version"* mode.

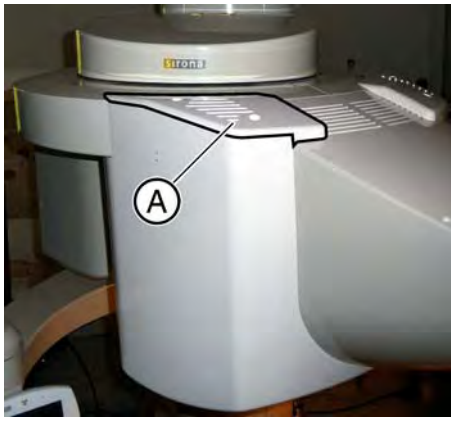
4.2.2 Updating the FaceScan firmware

There are two ways of updating the FaceScan firmware:

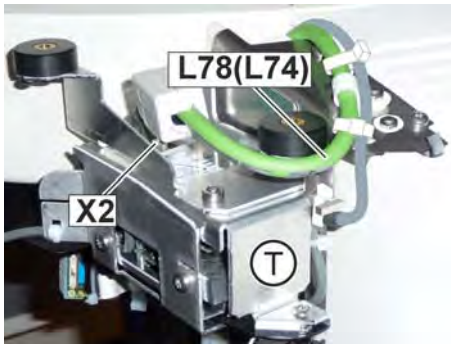
- Option 1: Update via USB stick [→ 54]
  The program data on the FaceScan unit is completely overwritten.
- Option 2: Update via the network [→ 56]
  The program data is transferred to the FaceScan unit. Unlike in option 1, the unit configuration data is, however, *not* overwritten.

4.2.2.1 Option 1: Update using the FaceScan USB stick

Opening FaceScan



1. Unscrew the cover (A) from the FaceScan.



2. Pull gray cable **L78.4** from slot **X2** of the **FACESCAN** modular board.
3. Unscrew the protective plate (T) from the FaceScan unit.
   ↳ The **FACESCAN** modular board is visible.
4. Plug cable **L78.4** again into slot **X2** on the **FACESCAN** modular board.

Updating the software

1. Plug the FaceScan USB stick into the PC.
2. Open the "facescan_settings.cfg" configuration file in a text editor.

3. Enter the value "UPDATE" for the "USB_STICK_MODE" entry (for example: USB_STICK_MODE=UPDATE).
4. *For selection by DHCP:*
   Enter the value "ON" for the "DCHP_STATE" entry (for example: DHCP_STATE=ON).

or

➢ *For selection without DHCP:*
Enter the value "OFF" for the "DCHP_STATE" entry (for example: DHCP_STATE=OFF).

5. Enter the value "OFF" for the "DCHP_STATE" entry (for example: DHCP_STATE=OFF).
6. Specify the IP address and the subnet mask in the "IP" and "Netmask" entries.
7. Save your changes.
8. **NOTICE! Incorrect removal of the USB stick can lead to loss of data on the USB stick.**
   Remove the USB stick using the Safely Remove function (operating system) of the PC.

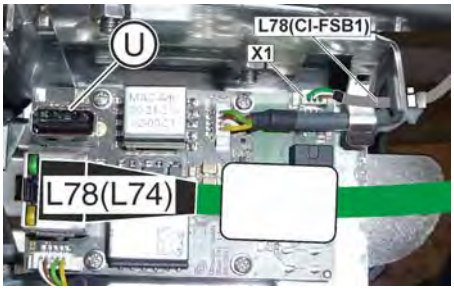
Starting the update

✓ **The unit must be switched off.**

NOTICE

Always switch the device off before inserting the USB stick.

Before the FaceScan USB stick can be inserted into the USB socket of the **FACESCAN** modular board, GALILEOS **must** be **switched off**. Otherwise the update will not be completed. Instead, the configuration data stored on the USB stick will be uploaded to GALILEOS.



1. Insert the USB stick into the USB port (U) of the **FACESCAN** modular board.
2. Switch the unit on again.
   ↳ The FaceScan will be updated.
   Both LEDs in the status display light up during the update.
   The process takes around 5 minutes (around 1 minute in the event of an error).
   ↳ The "USB_STICK_MODE" entry in the facescan_settings.cfg file is reset to "CONFIG".
3. Wait until the green status display LED goes out.
   The blue LED should then light up.
   ↳ The update is completed.
4. Switch GALILEOS off.
5. Remove the FaceScan USB stick safely from the USB port.

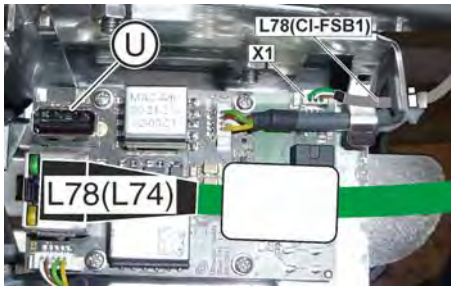
Checking the update

1. Plug the FaceScan USB stick into a PC.
2. Open the "facescan_settings.log" log file in a text editor.
3. Check the entries in the log file.

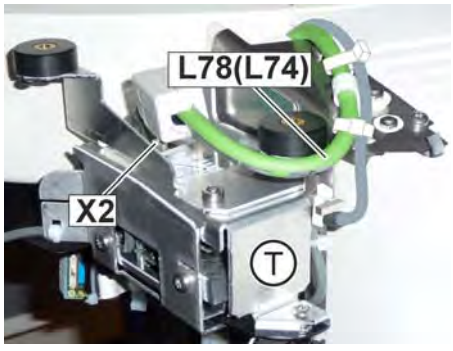
↳ If the update was successful, the log file should state:
"Facescan device software updated with version … successful!"

4. Remove the USB stick from the PC.

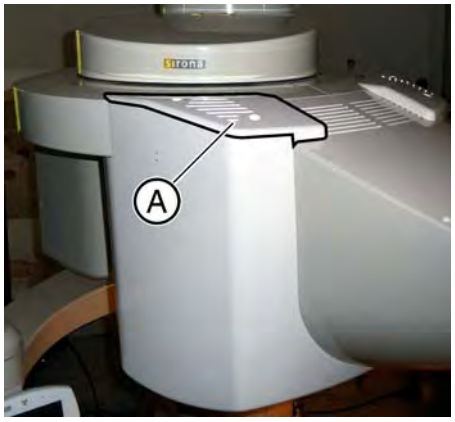
Closing FaceScan



1. Pull cable **L78(L74)** from the **X2** socket of the **FACESCAN** modular board.
2. Screw the protective plate (T) onto the FaceScan unit.



3. Plug cable **L78(L74)** into the **X2** socket on the **FACESCAN** modular board.



4. Screw down the cover (A) onto the FaceScan.

Concluding the update

1. Switch the unit on.
2. Perform a complete unit calibration [→ 145].
3. Perform a white balance [→ 168].

4.2.2.2 Option 2: Firmware update via the network

Opening the web dialog

1. In SIDEXIS Manager, start the *"Facescan Configuration"* application.
2. Click on the *"Facescanner in browser"* button.
   ↳ A password dialog box opens.
3. In the field *"User"* enter *"service"*.

4. In the field *"Password"* enter *"sirona"*.

↳ The *"Facescan Device Service "* web dialog opens.

Select Update dialog

1. In the menu bar, select the menu item *"UPDATE"*.
   ↳ The *"Facescan Firmware Update"* window opens.
2. Press the *"Enter Update Menu"* button.
   ↳ The unit restarts in update mode with the message *"System rebooting... Please, wait until both status leds are on and press 'Go to Update Menu'"*. The process takes a few minutes.
3. When both LEDs light up, press the *"Go to Update Menu"* button.

Starting the update

1. Press the *"Browse..."* button.
2. Navigate to the firmware update file and select it.
3. Press the *"Upload Image"* button.
   ↳ The upload runs in the background and can take up to 10 mins. The upload ends with the message *"Update successfully done!"*.
4. Press the *"Run Update"* button.
   ↳ The update starts.
   The update ends automatically after around 5 minutes with the message *"Update successfully done!"*.
5. Press the *"Reboot"* button.
   ↳ The message *"Device rebooting. Service menu will be accessible in several minutes."* appears.
   ↳ The unit is restarted.
6. Wait around a minute until the green LED on the FaceScan unit begins to light up.
7. **Only if the SIRONA browser is not being used:**
   Refresh the browser display (e.g. in Windows® Internet Explorer: press [F5]).

↳ The update is completed.

Concluding the update

1. **Only at initial installation:** Perform a complete unit calibration [→ 145].
2. **Only at initial installation:** Perform a white balance [→ 168].

4.3 Configuring the unit

4.3.1 Configuring the unit via the SIDEXIS Manager

SIDEXIS Manager
SIDEXIS Manager
Close
SiXABCon
Configuration of the X-ray components
SiRescue
Download an exposure from an X-ray unit (ORTHOPHOS XG, ORTHOPHOS DS (XAB), XAB IO, USB-Box)
NGVidCap
Configuration of the WDM and VfW video components
Sirona Control Server
Sirona Control Server Monitor
XG3D Configuration
XG3D Configuration
Sirona Control Admin Rescue
Management of Sirona Control Servers and GALILEOS data at the RCU (Rescue)
NGStationMgr
Management of the SIDEXIS stations
NGSQLConnect
This application connects SIDEXIS with another SQL Server database
NGDBComb
Clean up 3D raw data

4.3.1.1 Setup of an X-ray component

Since it is addressable via the network, the X-ray component can in principle be activated for X-ray image acquisition by any of the PCs connected to the network.

The program SiXABCon is used to manage networkable X-ray components. It can be executed on any PC in the network on which SIDEXIS XG has been installed.

IMPORTANT: In order to avoid IP address conflicts, you should never operate several networkable X-ray components in the network using the same IP address. Each X-ray component needs to be assigned a unique IP address.

Factory setting of the TCP/IP address of the unit:

192.168.15.240 (subnet mask: 255.255.255.0)

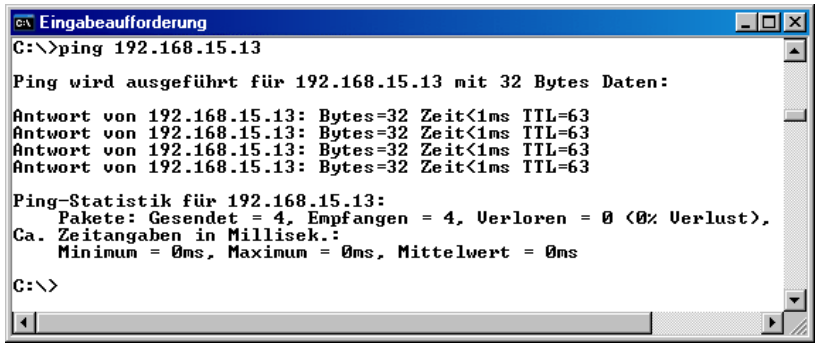
Checking existing IP addresses

To find out whether an IP address already exists in the network, enter the "PING" function in the input prompt (DOS window).

1. Switch on *all* network devices (computers, printers, X-ray components) which are being operated in the network.

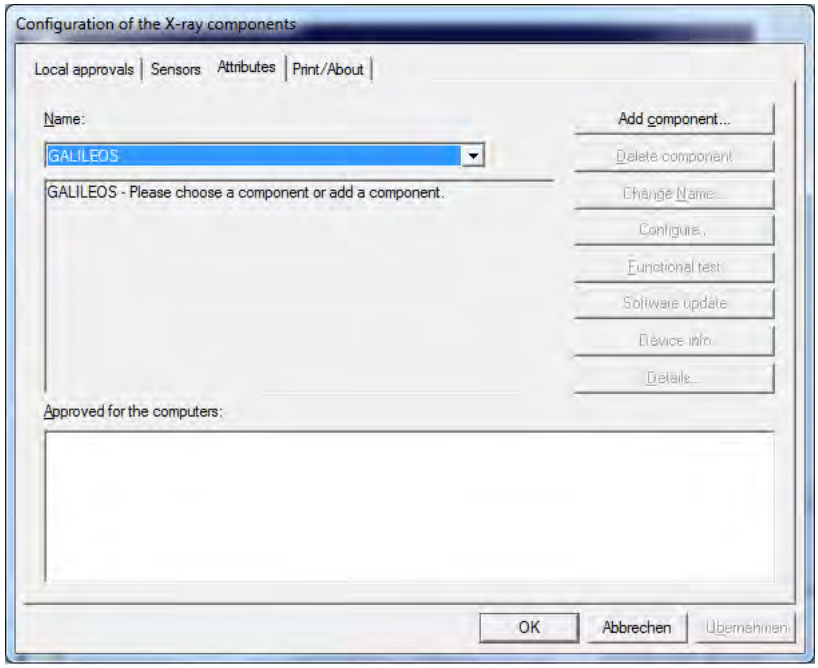
2. Invoke the input prompt (DOS window) from a network computer.
3. At the input prompt, enter "ping" followed by the address to be checked and then press the Enter key.
   Example: "ping 192.168.15.13"

↳ If a network device responds, then this address has already been assigned.

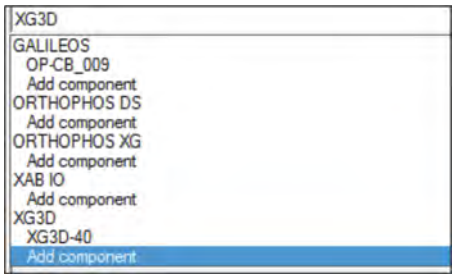


4.3.1.1.1 Selecting an X-ray component

1. Switch all networkable X-ray components off.
2. Start the *"SIDEXIS Manager"* under *"start"* | *"Program Files"* | *"SIDEXIS"* .
3. Click on *"Configuration of the X-ray components"*.
   ↳ The *"Configuration of the X-ray components"* menu opens.
4. Select the *"Attributes"* tab.



5. Select the name of the desired X-ray component in the *"Name"* pull-down menu ("XG3D" in the example); then click the *"Add component"* button.



or

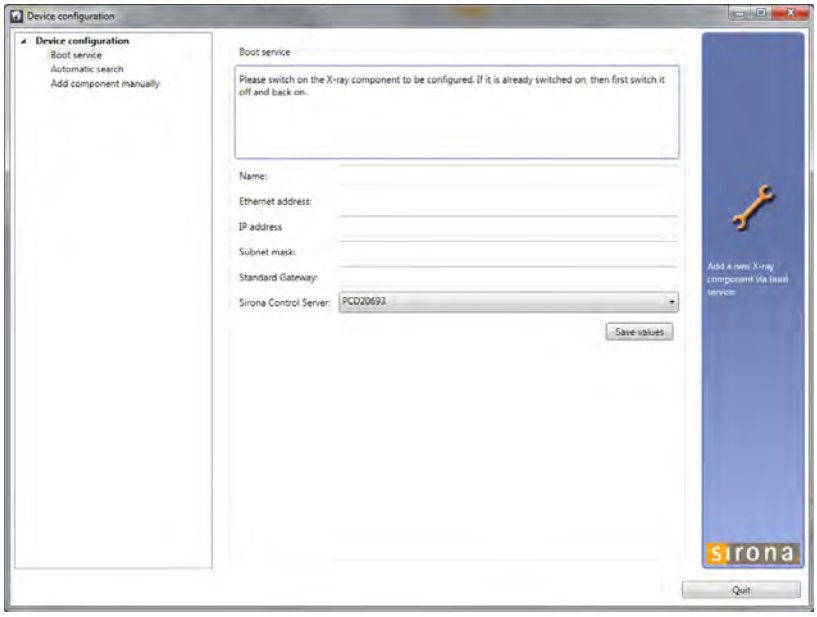
➢ Select the text *"Add component"* under the desired X-ray component in the *"Name"* pull-down menu.

↳ The password dialog box appears.

6. Enter the service password [→ 148] and confirm your input by clicking the *"OK"* button.

↳ The *"Device configuration"* menu opens.

↳ The element *"Boot service"* is selected automatically.



Boot service

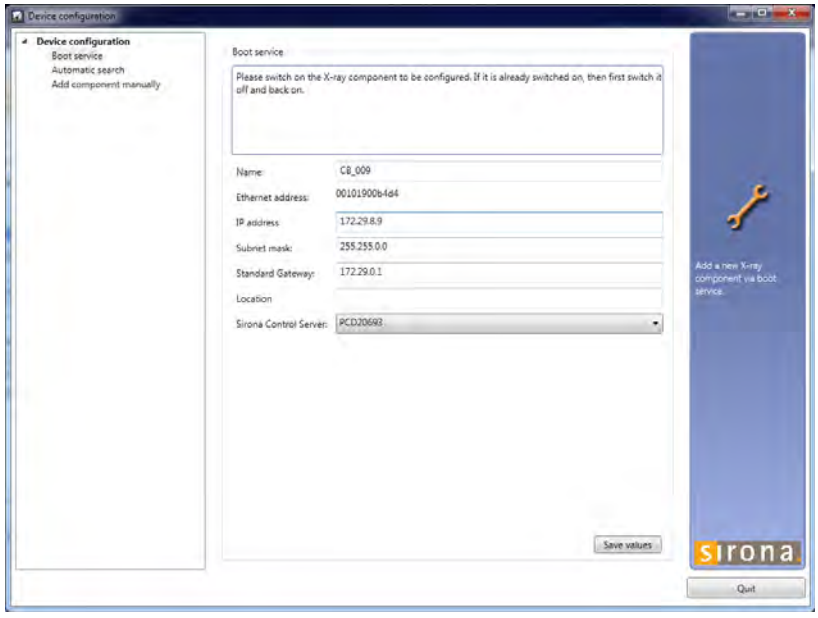
IMPORTANT
Automatic addition and setup of the X-ray component via the boot service functions properly only if the unit is started with the default factory-set IP address. If the IP address already has been changed, reset it to the factory setting via service routine S037.2 [→ 239] or use the elements *"Automatic search"* or *"Add component manually"* (see section on "Alternatives to the boot service".

✓ The element *"Boot service"* is selected in the structure tree.

1. Switch the unit on.

↳ The unit is detected in the network and the values for the IP address, subnet mask and standard gateway are automatically imported to the input fields of the menu.

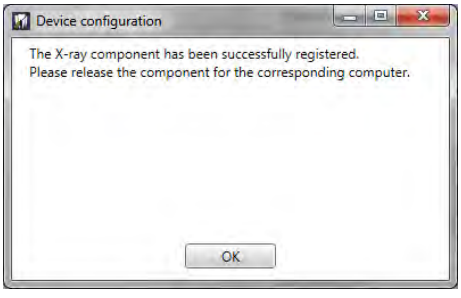
IMPORTANT
If the unit is not automatically detected in the network, it is possible to manually assign a static IP address via service routine S037.4 [→ 243].

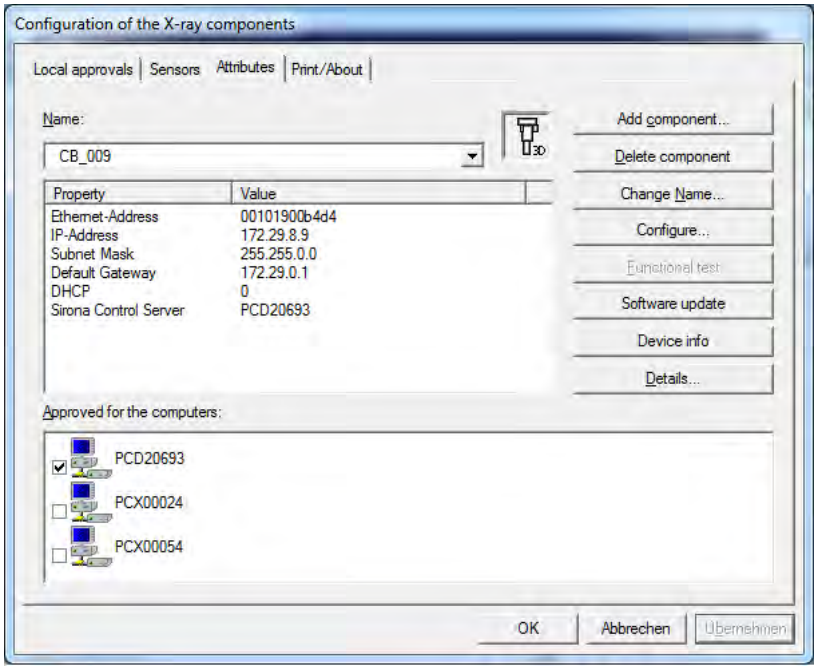


IMPORTANT

Each unit must be assigned a unique IP address in the network.

2. If you want to, you can enter an individual IP address in the *"IP address"* input field and then click into one of the other input fields with the cursor.
   - ↳ Default values suitable for the IP address are automatically entered in the *"Subnet mask"* and *"Standard Gateway"* input fields.
3. You can either overwrite the default values in the input fields or leave them unchanged, depending on the network involved.
4. Select the desired RCU in the *"Sirona Control Server"* pull-down menu.
5. Confirm the settings you have made by clicking the *"Save values"* button.
   - ↳ The settings are saved.
   - ↳ The *"Device configuration"* dialog window appears and informs you that the configuration of the X-ray component has been successfully completed.
6. Confirm this dialog by clicking the *"OK"* button.
7. Close the *"Device configuration"* menu by clicking the *"Quit"* button.
   - ↳ The new X-ray component appears in the device list of the menu *"Configuration of the X-ray component"*.

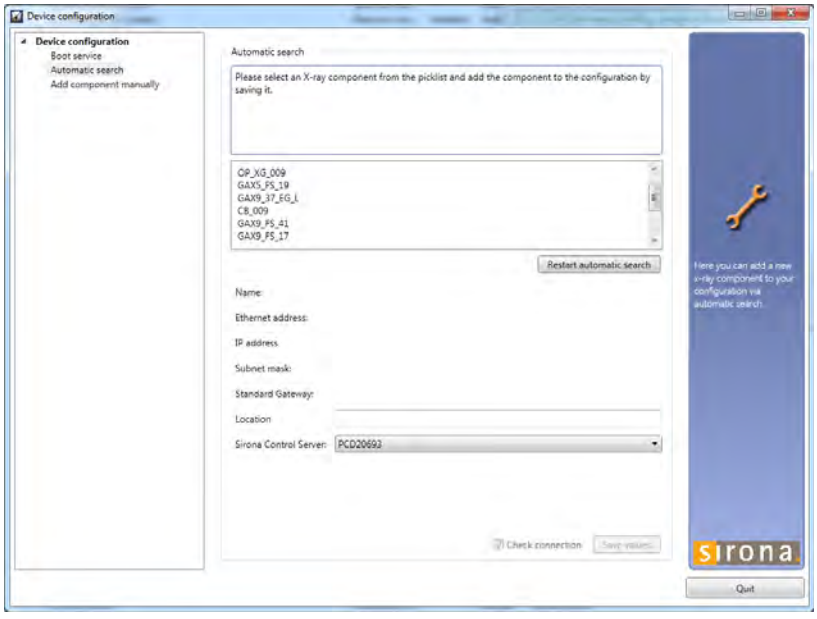

Device configuration
The X-ray component has been successfully registered.
Please release the component for the corresponding computer.
OK



Alternatives to the boot service

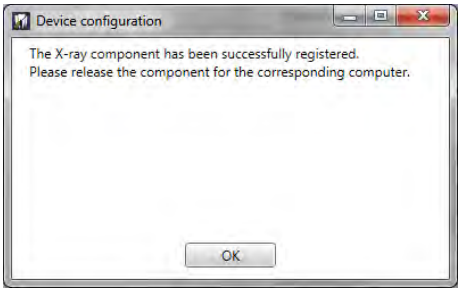
As an alternative to adding new X-ray components via the boot service, you also can add them via the *"Automatic search"* or the *"Add component manually"* function.

Automatic search

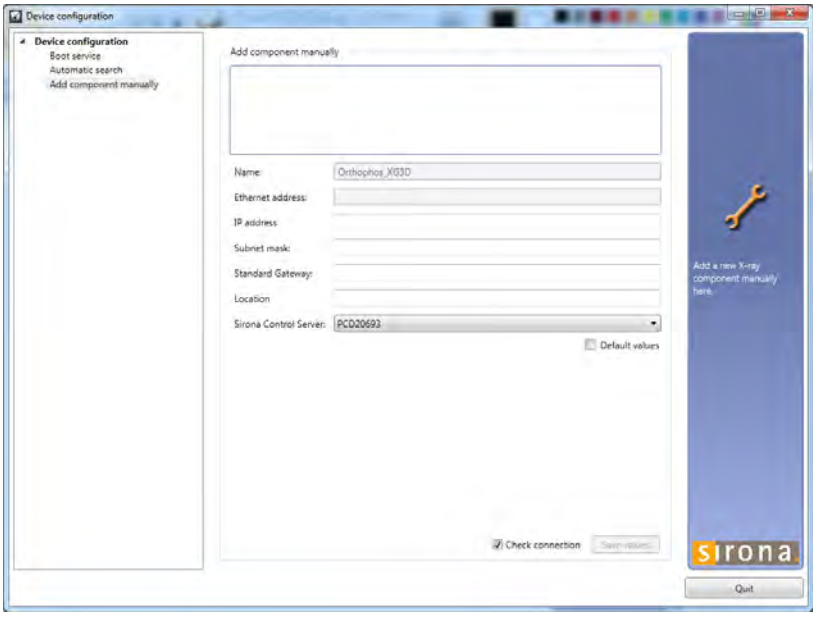


1. Select the *"Automatic search"* element.
   ↳ The network is searched for existing X-ray components. All X-ray components found appear in the menu list.
2. Select the desired X-ray component from the list.
   ↳ The values for the IP address, subnet mask and standard gateway are automatically imported to the input fields of the menu.

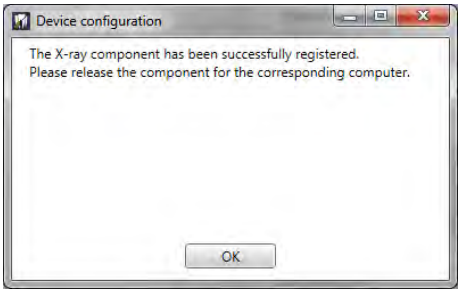
3. Select the desired RCU in the *"Sirona Control Server"* pull-down menu.
4. Confirm the settings you have made by clicking the *"Save values"* button.
   ↳ The settings are saved.
   ↳ The *"Device configuration"* dialog window appears and informs you that the configuration of the X-ray component has been successfully completed.
5. Confirm this dialog by clicking the *"OK"* button.
6. Close the *"Device configuration"* menu by clicking the *"Quit"* button.
   ↳ The new X-ray component appears in the device list of the menu *"Configuration of the X-ray component"*.


Device configuration
The X-ray component has been successfully registered.
Please release the component for the corresponding computer.
OK

Adding the component manually

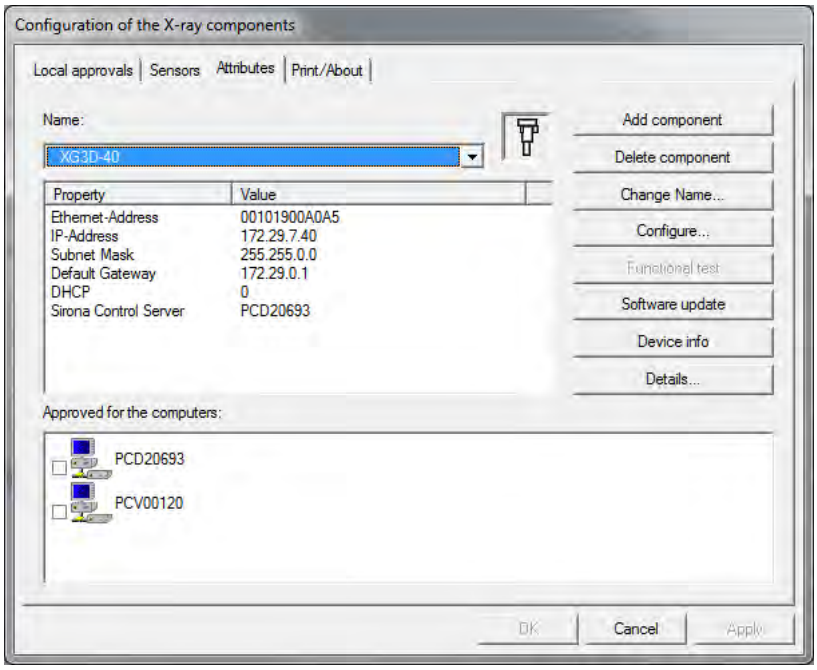


1. Select the *"Add component manually"* element.
2. Enter the values in the menu input fields manually.
3. Select the desired RCU in the *"Sirona Control Server"* pull-down menu.
4. Confirm the settings you have made by clicking the *"Save values"* button.
   ↳ The settings are saved.
   ↳ The *"Device configuration"* dialog window appears and informs you that the configuration of the X-ray component has been successfully completed.
5. Confirm this dialog by clicking the *"OK"* button.
6. Close the *"Device configuration"* menu by clicking the *"Quit"* button.
   ↳ The new X-ray component appears in the device list of the menu *"Configuration of the X-ray component"*.


Device configuration
The X-ray component has been successfully registered.
Please release the component for the corresponding computer.
OK

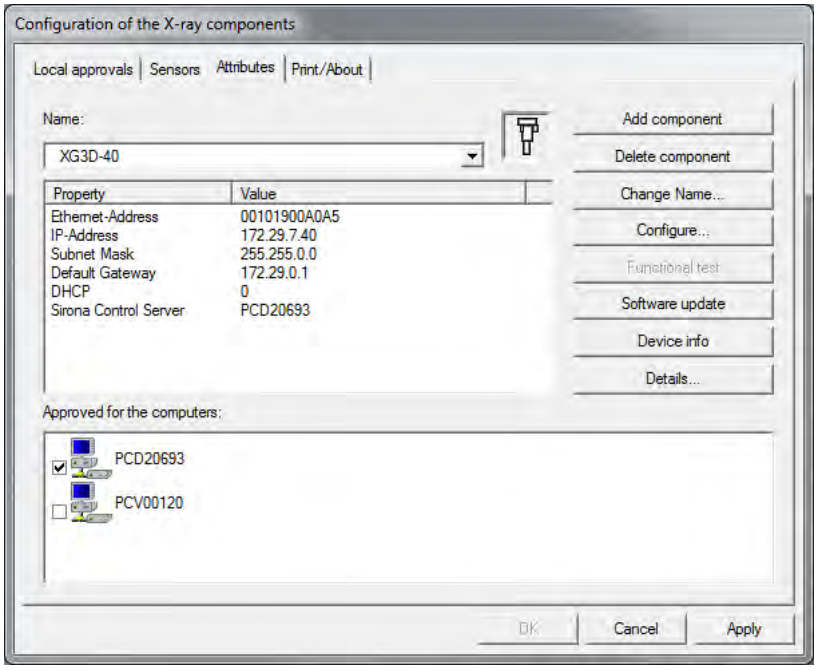
4.3.1.1.2 Approval of the X-ray component

✓ The X-ray component must have been selected [→ 59] via the *"Device configuration"* menu.



➢ Click on the check box in front of the X-ray component that you would like to enable and accept the setting by clicking on the *"Apply"* button.

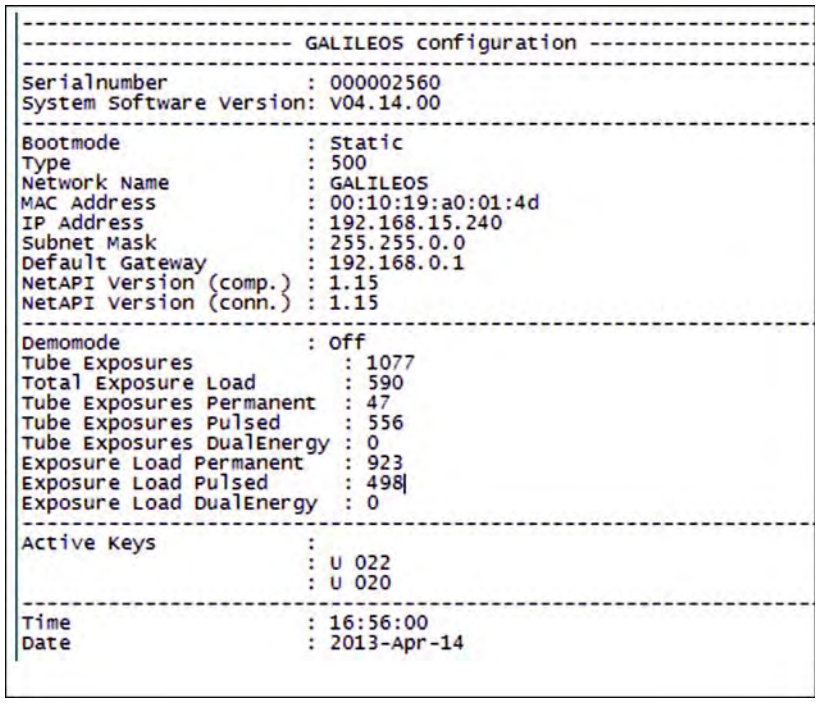
↳ The X-ray component is enabled.



Checking enablement

➢ To check the communication with the unit, click the *"Device info"* button.

↳ If the unit is communicating, a logfile with information on the unit configuration appears.



```
---------------------------------------------------------------------
---------------------- GALILEOS configuration -----------------------
---------------------------------------------------------------------
Serialnumber           : 000002560
System Software Version: V04.14.00
---------------------------------------------------------------------
Bootmode               : Static
Type                   : 500
Network Name           : GALILEOS
MAC Address            : 00:10:19:a0:01:4d
IP Address             : 192.168.15.240
Subnet Mask            : 255.255.0.0
Default Gateway        : 192.168.0.1
NetAPI Version (comp.) : 1.15
NetAPI Version (conn.) : 1.15
---------------------------------------------------------------------
Demomode               : Off
Tube Exposures           : 1077
Total Exposure Load      : 590
Tube Exposures Permanent : 47
Tube Exposures Pulsed    : 556
Tube Exposures DualEnergy : 0
Exposure Load Permanent  : 923
Exposure Load Pulsed     : 498
Exposure Load DualEnergy : 0
---------------------------------------------------------------------
Active Keys            :
                       : U 022
                       : U 020
---------------------------------------------------------------------
Time                   : 16:56:00
Date                   : 2013-Apr-14
```

4.3.2 Configuring FaceScan

FACESCAN is generally configured via the integrated web dialog on the FaceScan unit [→ 68].

There are however two basic options for configuring the FaceScan unit:

- Type 1: Configuration using the Facescan USB stick [→ 66]
- Type 2: Configuration over a network cable (peer-to-peer) [→ 68]

4.3.2.1 Type 1: Configuration using the Facescan USB stick

Starting the configuration

1. Insert the FaceScan USB stick into a PC.
2. **Important!** Check the entry "USB_STICK_MODE". The value must be set to "CONFIG".
3. Using a text editor program, edit the configuration file "facescan_settings.cfg" on the FaceScan USB stick and save this (see section "Syntax of the configuration file "facescan_settings.cfg" [→ 68]“).
4. **NOTICE! Improper removal of the USB stick can lead to loss of data on the USB stick.**
   Remove the USB stick using the "safely remove" function (operating system) of the PC.
5. Switch GALILEOS on.
6. Wait until the green LED of the FaceScan status display lights up.
   ↳ The FaceScan is now ready for operation.

NOTICE

Always switch the device on before inserting the USB stick!

Before the FaceScan USB stick can be inserted into the USB socket of the **FACESCAN** modular board, GALILEOS **must** be **switched on**. Otherwise, the FaceScan configuration data will be reset to the factory settings.

7. Insert the FaceScan USB stick into the USB port of the **FACESCAN** board.
   ↳ The FaceScan will be configured.
   ↳ Both LEDs of the status display light up.
8. Wait until the light on both the LEDs of the status display goes out (process lasts some 10 secs).

NOTICE

Faults during configuration

If there has been an error during configuration, only the blue LED of the status display goes out.

Starting the device again is not necessary here.

➢ In the event of an error, check the log file "facescan_settings.log" on the USB stick.

➢ Make sure to read section Syntax of the configuration file "facescan_settings.cfg" [→ 68]“.

➢ Repeat the configuration process.

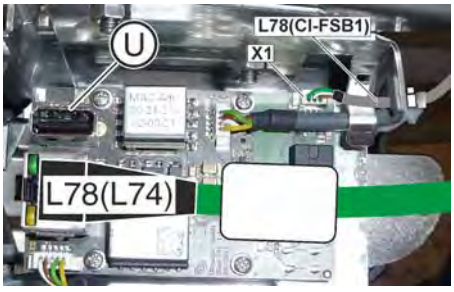
9. **IMPORTANT!** Remove the FaceScan USB stick from the USB socket.
10. Perform a restart of the device.

↳ The FaceScan configuration is complete.

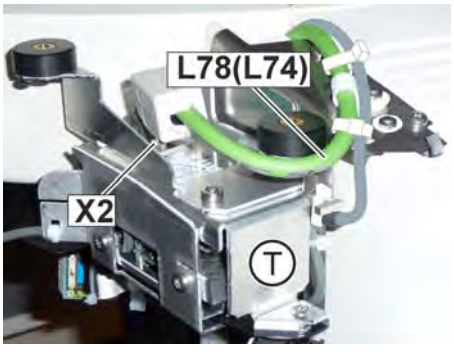
Checking the configuration

1. Insert the FaceScan USB stick into a PC.
2. With a text editor program, open the log file "facescan_settings.log".
3. Check the entries in the log file.
   ↳ If the configuration has been successful, the log file should state: *"Network configuration successful!"*
4. Remove the USB stick from the PC.

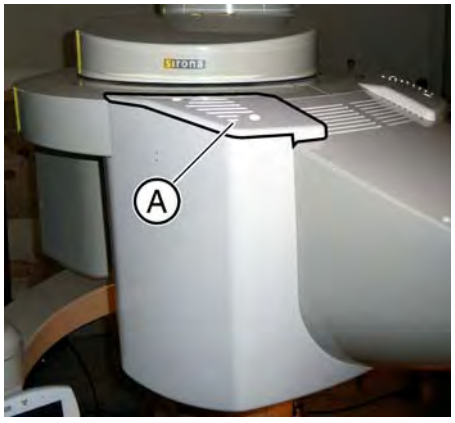
Closing FaceScan



1. Pull cable **L78(L74)** from the **X2** socket of the **FACESCAN** modular board.
2. Screw the protective plate (T) onto the FaceScan unit.



3. Plug cable **L78(L74)** into the **X2** socket on the **FACESCAN** modular board.



4. Screw down the cover (A) onto the FaceScan.

4.3.2.1.1 Syntax of the configuration file "facescan_settings.cfg"

IMPORTANT

Pay attention to the syntax!

Text entries should **never** have a space before and after "=".

Examples:
Correct: USB_STICK_MODE=CONFIG
Incorrect: USB_STICK_MODE= CONFIG

Configuration without DHCP

Text entry (factory setting):

```
USB_STICK_MODE=CONFIG
DHCP_STATE=OFF
IP=192.168.16.240
Netmask=255.255.255.0
```

IMPORTANT

Changes to network addresses.

➢ Adjust the entries *"IP"* (IP address) and *"Netmask"* (subnet mask) as required.

Configuration with DHCP

Text entry:

```
DHCP_STATE=ON
```

4.3.2.2 Type 2: Configuration over a network cable (peer-to-peer)

Connecting the Facescan unit to a PC

✓ A PC with an installed web browser must be available.
✓ The factory setting of the IP address of the Facescan is 192.168.16.240.
✓ The PC employed must be in the 192.168.16.xx network; otherwise, no network connection can be achieved.

➢ Using a network cable, connect the PC directly to the GALILEOS media converter with installed Facescan.

Opening the web dialog

1. Switch GALILEOS on.
2. Open up a web browser on the PC.
3. Enter the Facescan IP address into the web browser (http://<IP-Adresse>).
   ↳ A password dialog box opens.
4. In the field *"User"* enter *"service"*.
5. In the field *"Password"* enter *"sirona"*.

↳ The *"Facescan Device Service "* web dialog opens.

Selecting the configuration dialog

➢ In the menu bar, select the menu item *"CONFIGURATION"*.

↳ The *"Facescan Configuration"* window opens.

Starting the configuration

1. *When selecting with DHCP:*
   Set the *"DHCP State"* field to *"On"*.

or

➢ *When selecting without DHCP:*
Set the *"DHCP State"* field to *"Off"*.

2. In the *"IP Adresse"* field, enter the desired IP address (factory setting: 192.168.16.240).
3. In the *"Netmask"* field, enter the desired subnet mask (factory setting: 255.255.255.0).

Completing the configuration

➢ Confirm the configuration with the *"Configure Network"* button.

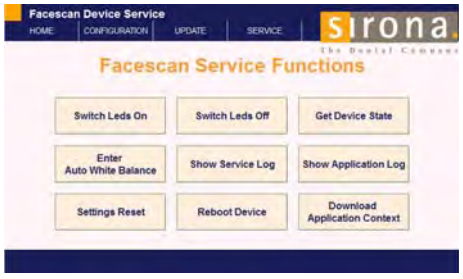
↳ The Facescan restarts with the modified settings.

4.3.2.3 Resetting the FaceScan configuration to factory default settings

Opening the web dialog

1. In SIDEXIS Manager, start the *"Facescan Configuration"* application.
2. Click on the *"Facescanner in browser"* button.
   ↳ A password dialog box opens.
3. In the field *"User"* enter *"service"*.
4. In the field *"Password"* enter *"sirona"*.

↳ The *"Facescan Device Service "* web dialog opens.



Selecting the service dialog

➢ In the menu bar, select the menu item *"SERVICE"*.

↳ The *"Facescan Service Functions"* window opens.

Reset

1. Press the *"Settings Reset"* button.
   ↳ A reset dialog opens.

NOTICE

Complete loss of user data

When the unit is reset to factory settings, all user data is overwritten, including white balance and calibration data.

The network settings are, however, retained.

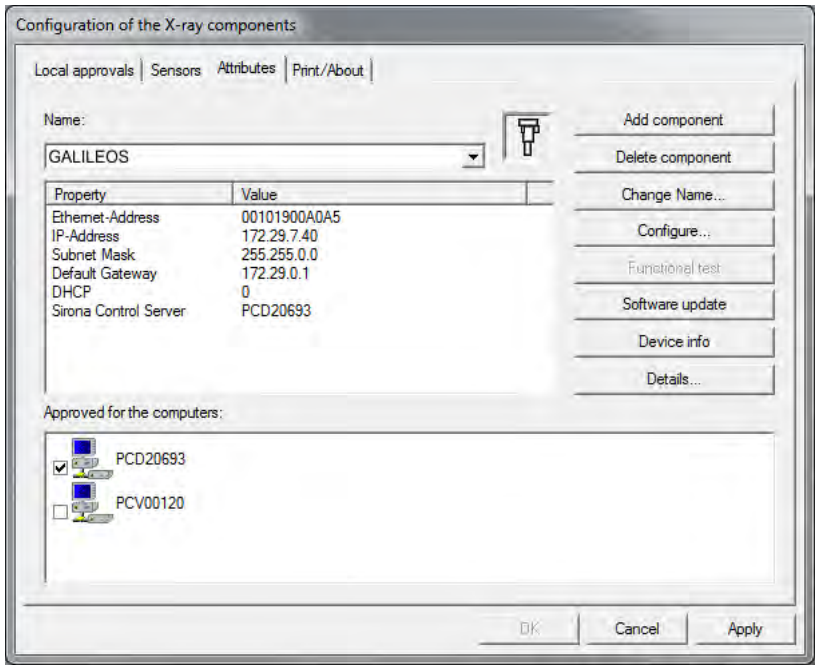
2. Press the *"Settings Reset"* button.

↳ The configuration is reset to the factory settings.

4.4 Reading unit data

4.4.1 Reading the unit data of the GALILEOS via "Extended Details"

1. Start the *"SIDEXIS Manager"* under "Start"/"Programs"/"SIDEXIS"/ *"SIDEXIS XG"*.
2. Click on *"Configuration of the X-ray components"*.
   ↳ The *"Configuration of the X-ray components"* menu opens.



3. Select the *"Attributes"* tab.
4. Click the *"Details..."* button.
   ↳ The current parameters are read from the unit and filed in an XML file under the network name of the unit in the PDATA/.../P2K_Config folder. The process can take up to 30 seconds. After the parameters are read, an editor displaying the data is opened automatically.

Details.txt

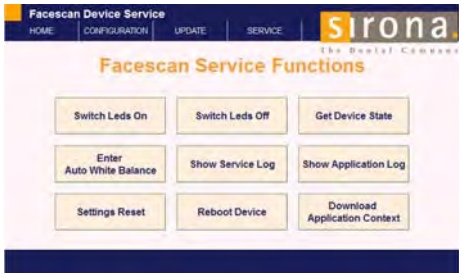
```
32
33 ------------------------------------------------------------------------
34 ---------------------  Standard Configuration DX 11  ---------------------
35 ------------------------------------------------------------------------
36 Name of flat module:         'DX11    '
37 Code Number:                 ' 5925214'
38 Serial Number:               '       329039368'
39 Hardware Index:              0
40 Hardware Revision:           2
41 Test Date:                   2010-Feb-15
42 Test Counter:                1
43 Processor Derivate:          '           MPC855TZP80D4'
44 Previous Software Version:   132
45 Previous Software Revision:  2
46 Date Last Software Update:   2010-Oct-01
47 Current Software Version:    148
48 Current Software Revision:   39
49 GBP5 defined area:           0xff 0xff 0xff 0xff 0xff 0xff 0xff 0xff
50
51 ------------------------------------------------------------------------
52 ---------------------  Extended Configuration DX 11  ---------------------
53 ------------------------------------------------------------------------
54 DX11 SerialNo:                  18757644
55 DX1FpgaVersion:                 3
56 DX1FpgaRevision:                4
57 DX1HwVersion:                   8
58 DX11MemorySize:                134217728
59 DX11CpuClock:                  80020000
60 BspVersion:                    1.4/2-IX0204
61
62 ------------------------------------------------------------------------
63 ---------------------      Error Logging Data DX 11  ---------------------
64 ------------------------------------------------------------------------
65
66 Timestamp            Categorie      Message
67 2010-10-12, 10:13:33 [Message      ]: Logbook started
68 2010-10-12, 10:13:55 [Error        ]: E1 11 20 (ERR_DX11_INVALID_CB_CALIBDATA)
69 2010-10-12, 10:17:22 [RTC Date/Time change]: Tried to change to: 2010-Oct-12, 10:17:22
70 2010-10-12, 10:19:57 [Message      ]: Logbook started
71 2010-10-12, 10:20:19 [Error        ]: E1 11 20 (ERR_DX11_INVALID_CB_CALIBDATA)
72 2010-10-12, 10:21:37 [RTC Date/Time change]: Tried to change to: 2010-Oct-12, 10:18:56
73 2010-10-12, 10:40:27 [Message      ]: Logbook started
74 2010-10-12, 10:40:49 [Error        ]: E1 11 20 (ERR_DX11_INVALID_CB_CALIBDATA)
75 2010-10-12, 10:41:36 [RTC Date/Time change]: Tried to change to: 2010-Oct-12, 10:44:17
76 2010-10-12, 10:59:54 [Message      ]: Logbook started
77 2010-10-12, 11:00:15 [Error        ]: E1 11 20 (ERR_DX11_INVALID_CB_CALIBDATA)
78 2010-10-12, 11:00:41 [RTC Date/Time change]: Tried to change to: 2010-Oct-12, 11:00:41
79 2010-10-12, 11:03:10 [Message      ]: Logbook started
80 2010-10-12, 11:06:34 [Message      ]: Logbook started
```

4.4.2 Reading FaceScan unit data over the network

Opening the web dialog

1. In SIDEXIS Manager, start the *"Facescan Configuration"* application.
2. Click on the *"Facescanner in browser"* button.
   ↳ A password dialog box opens.
3. In the field *"User"* enter *"service"*.
4. In the field *"Password"* enter *"sirona"*.

↳ The *"Facescan Device Service "* web dialog opens.



Selecting the service dialog

➢ In the menu bar, select the menu item *"SERVICE"*.

↳ The *"Facescan Service Functions"* window opens.

Reading unit settings

1. Press the *"Get Device State"* button.
   ↳ A dialog box to read the unit settings opens.
2. Press the *"Press Here to Download"* button.
3. Save the archived unit settings to the hard disk.

4.5 Using demo mode – operation without radiation release

For demo use, the "X-ray detector dummy for GALILEOS" (Order No. 61 19 007) should be used instead of the actual X-ray detector. For further information, please refer to the instructions included with the dummy.

If the volume tomograph is to be presented as a demo unit at trade fairs or exhibitions, it must be ensured that radiation release is blocked.

4.5.1 Switching on demo mode

When operated in demo mode, the unit must not release any radiation.

For this reason, you must take the following safety measures:

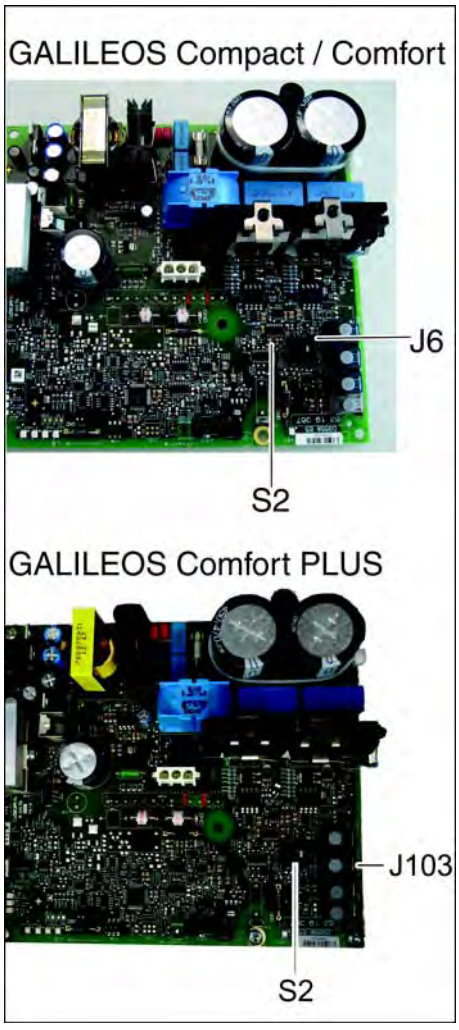
1. Switch off the unit.

⚠ DANGER

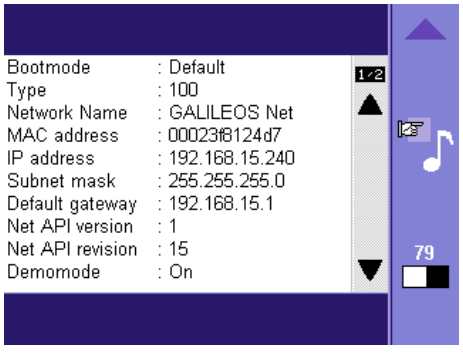
Perilous shock hazard!

It is essential to switch off the unit and to wait at least another 4 minutes before taking off the covers of the X-ray tube assembly.

2. Remove the "Rear tube assembly" cover [→ 36].
3. Remove the cover plate of board DX6 [→ 268].



4. Set dip switch **S2** (DX6) to **position 2**.
IMPORTANT: If switch **S2** is not set to position 2 in demo mode before switching off the unit, various error messages will display when the unit is turned back on.
5. Pull cable **L5** (XRAY) off connector **J6**/**J103** (DX6).
   ↳ Radiation release is now no longer possible.



6. *Only possible with the Easypad:*
Switch on the unit and check the mode on the info screen.
Demo mode: ON means that: Demo mode is switched on (radiation release is not possible)
Demo mode: OFF means that: Demo mode is switched off (radiography, X-ray radiation are possible!)
7. Switch the unit off again and reattach the cover plate and the tube assembly cover by following the dismantling procedure in reverse order.

4.5.2 Switching off demo mode

1. Switch off the unit.

⚠ DANGER

Perilous shock hazard!

It is essential to switch off the unit and to wait at least another 4 minutes before taking off the covers of the X-ray tube assembly.

2. Remove the "Rear tube assembly" cover [→ 36].

3. Remove the cover plate of board DX6 [→ 268].
4. Set the dip switch **S2** (DX6) to **position 1**.
5. Connect cable **L5** (XRAY) to connector **J6**/**J103** (DX6).
   ↳ Radiation release is now once again possible.
6. *Only possible with the Easypad:*
   Switch on the unit and check the mode on the info screen.
   Demo mode: ON means that: Demo mode is switched on (radiation release is not possible)
   Demo mode: OFF means that: Demo mode is switched off (radiography, X-ray radiation are possible!)
7. Switch the unit off again and reattach the cover plate and the tube assembly cover by following the dismantling procedure in reverse order.

4.5.3 Important information for repacking and transport

IMPORTANT

If a used carton on which one of the shockwatch or tiltwatch indicators has already been tripped is used to package the unit, please make an entry to that effect on the delivery note.

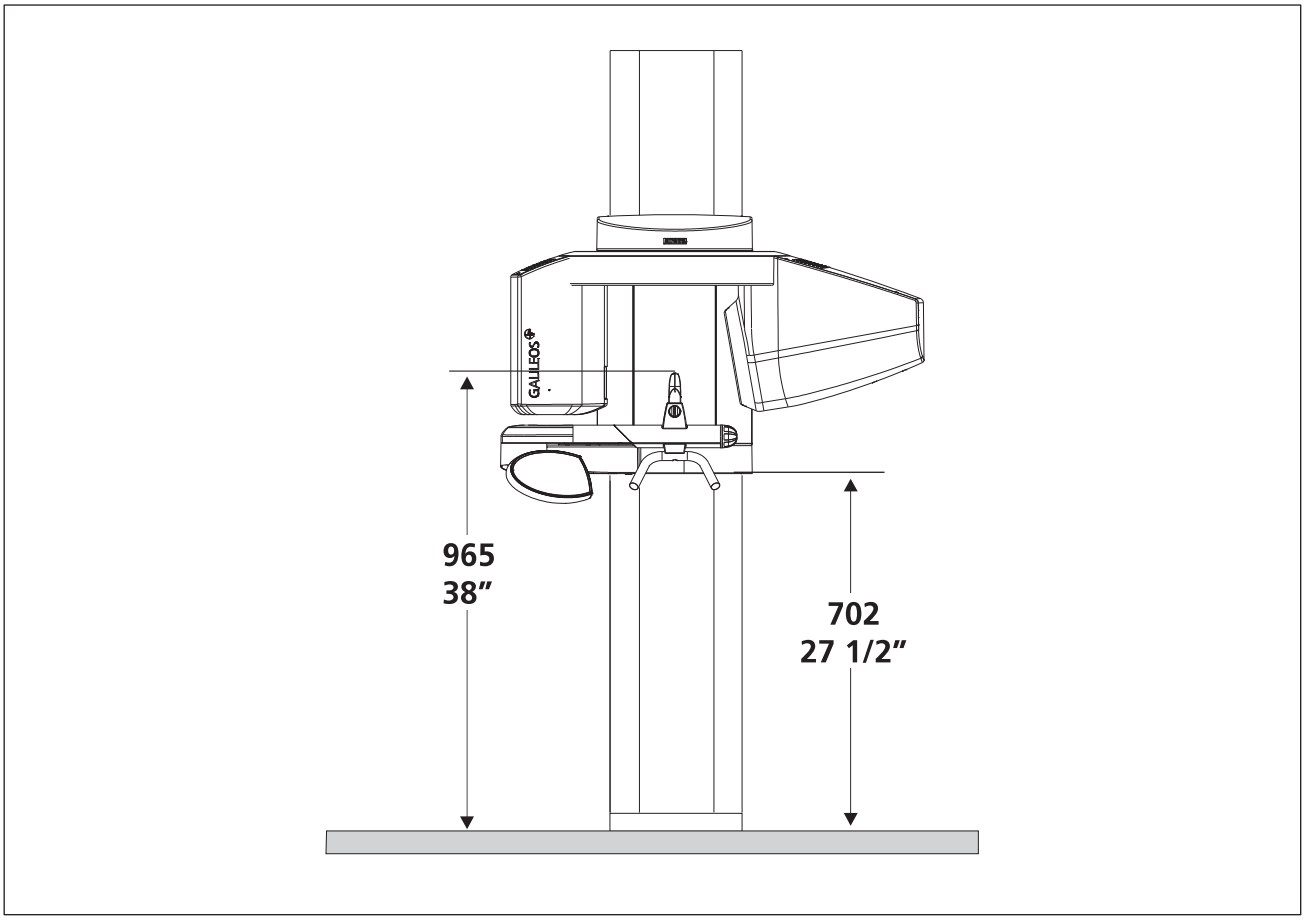
IMPORTANT

The bottom edge of the slide cover must be at the same height as the markings **A** in the column.

⚠ DANGER

Shock hazard!

Be sure to switch off the line power supply before connecting the line voltage!



1. Switch the unit on and move it to its packing height by actuating the up/down keys on the control panel.
   - Bite block height = 965 mm (displayed as height on the control panel)
   - Bottom edge of slide cover = 702 mm
2. Pack the panoramic X-ray unit
   (Packing condition (see section "Delivery").

Attaching the transport safety device

➢ Install the transport safety device by following the same procedure as Dismantling in reverse order.

5 Messages

The different message texts are displayed ...

- **GALILEOS Comfort/GALILEOS Comfort PLUS:** On the Easypad touchscreen
- **GALILEOS Compact:** on the Multipad display
- On the display of the remote control

There are 3 groups of message texts:

Help messages (Hx xx):

- Help messages are caused by operator errors.
- The user must take action.

Error messages (Ex yyxx):

- Error messages indicate unit faults.
- The user must take action to eliminate the fault(s).

System messages (Sxxx):

- System messages inform the user about the current operating status of the unit.
- The user does not have to take any action.

If error messages are displayed on the control panel that are not listed in this section (such as message 1311), these messages come from the Windows system. In such cases, you must check whether the firmware you are using is compatible with the SIDEXIS XG version and run a software update [→ 47] if necessary.

5.1 Help messages

The help messages are displayed as help codes (Hx xx) on the Easypad touchscreen or on the Multipad display as well as on the display of the remote control (if present). The codes tell you how to operate the system if radiation release is not possible due to a previous operator error.

The following list provides you with an overview of all help codes, their meaning and the action required to eliminate the corresponding problems.

IMPORTANT: The measures listed only clear help messages that result from operator errors. If it is not possible to clear a message by taking the measures listed, another type of error is the cause. In such cases, you should run an error diagnosis [→ 82].

Help code	Description	Actions required
H3 01	*"R button, move into starting position"*	• Press the R key. • Panoramic unit moves to starting position.
H3 20	*"R button, confirm exposure data"*	• Press the R key. • Exposure data are confirmed.
H3 21	*"Close the door"*	• Close the door or check door contact.

Help code	Description	Actions required
H3 23	*"Swivel pendant into end position"*	• Move the swivel arm to its end position (completely open or completely closed).
H3 24	The X-ray detector preparation is in progress.	• Wait until the X-ray detector is ready. This can take up to 10 minutes.
H4 03	*"Switch SIDEXIS to ready for exposure state"*	• Make SIDEXIS XG ready for exposure.
H4 07	*"SIDEXIS 3D Vorauswahl korrigieren"*	Correct SIDEXIS XG 3D preselection.
H4 08	*"SIDEXIS 3D Aufnahme wählen"*	Correct SIDEXIS XG 3D preselection.
H4 20	*"Get existing exposure"*	**IMPORTANT:** Do not switch the system off until the help message has disappeared. • Get exposure with "Sirona Control Admin" (see SIDEXIS XG *"Operator's Manual"* (REF 59 62 134).

5.2 System messages

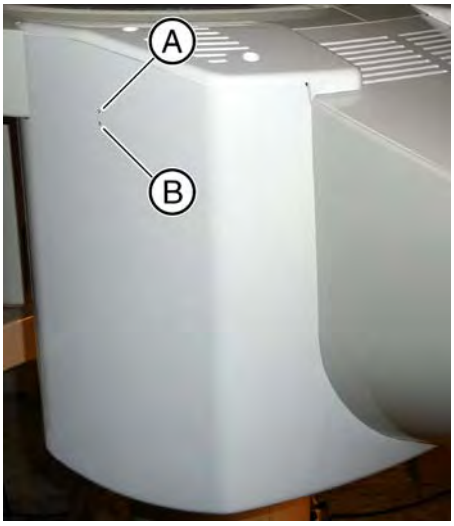
For the GALILEOS Compact, system codes are only displayed on the Multipad and the remote control. For the GALILEOS Comfort/GALILEOS Comfort^{PLUS}, the system messages are shown on the Easypad in plain text form.

System code	Description	Actions required
S100	*"System is starting"*	• Wait, no action required.
S110	*"Exposure not possible"*	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure
S150	*"Sensor is prepaired (XX seconds)"*	• Wait, no action required. The message will be deleted automatically (this may take up to 10 minutes).

5.3 Status messages and displays

On the control panel

Status displays		Description
Easypad	Multipad	
"Ready for exposure" *"X RAY"*	no special display; kV level and mAs are displayed	System is ready for exposure.
"X RAY Active!"	LED lights up on Multipad.	Exposure in progress.
"Please wait"	Progress bar	Unit waiting for operational readiness.
"Ready for exposure in XXs"	XXs	The cooling time countdown is running.



On the FaceScan

LED Blue (A)	LED Green (B)	Meaning
Off	Off	• FaceScan components are switched off • FaceScan components have shut themselves down. • A firmware update using the FaceScan USB stick has been completed
Off	On	• Standby
Flashing	Off	• Receptivity • Device ready for data transfer
On	Off	• Exposure
On or off	Flashing	• Data transfer
On	On	• Boot process • White balance • Network configuration • Firmware update • Reset to factory settings
Alternating with green LED at one-second intervals.	Alternating with blue LED at one-second intervals.	• Data upload during web update

5.4 Error messages

The error messages are displayed as error codes (Ex yy zz) on the Easypad touchscreen (GALILEOS Comfort/GALILEOS Comfort^{PLUS}) or on the Multipad display (GALILEOS Compact) as well as on the remote control display (if there is one).

The codes provide you with error type, error location and troubleshooting information.

5.4.1 Error code: Ex yy zz

The error messages are encoded according to the following pattern:

Ex	Error type	“Troubleshooting” classification for the user
yy	Location	Module, subsystem or logical function unit
zz	Consecutive number	Identification of error

5.4.2 Ex - Error type

Identifier **x** is intended to help you reach a decision quickly on how to proceed with the corresponding error.

x	Description	Error group	Actions required
1	System warning System message	This error group includes all errors that indicate still acceptable tolerance variations, or messages about states which do not directly affect system operation.	• Acknowledge the error message. If the error occurs again ... • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure If the error occurs again ... • Run an error diagnosis [→ 82].
2	Errors caused by system overload	This error group includes states that indicate temporary overtemperatures or similar, for example. The cause of the error disappears automatically after a certain waiting time.	• Acknowledge the error message. • Repeat the procedure step after a certain waiting time. If the error occurs again ... • Extend the waiting time. If the error occurs again ... • Run an error diagnosis [→ 82].
3	The system detects that a key was pressed during power-on.	This error group includes all errors that indicate invalid signal states of keys and safety signals during power-on.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure If the error occurs again... • Run an error diagnosis [→ 82].
4	Malfunction or mechanical obstruction of unit movements	This error group includes all errors that indicate problems with the motor-controlled movements on the outside of the unit.	• Acknowledge the error message and make sure that the movements of the unit are not obstructed. • Repeat the last procedure step or exposure. If the error occurs again ... • Run an error diagnosis [→ 82].
5	Malfunction during the exposure or during exposure preparation.	This error group includes all errors resulting from a certain system action triggered by the user which could not be performed because a required (internal) partial function (software or hardware) is not ready or fails.	• Acknowledge the error message. • Repeat the last procedure step or exposure. If the error occurs again ... • Run an error diagnosis [→ 82].

x	Description	Error group	Actions required
6	Error during system self-test.	This error group includes all errors which may occur spontaneously and without any related operator action. They may be caused by system self-tests.	• Acknowledge the error message. • Run an error diagnosis [→ 82]. Further operation of the unit is possible.
7	Unrecoverable system error.	This error group includes all errors which may occur spontaneously and without any related operator action. They may be caused by system self-tests. In this case it is absolutely certain that continued system operation is not possible.	• Run an error diagnosis [→ 82].

5.4.3 yy - Location

Identifier **yy** defines the location or logical function unit where the error has occurred.

yy	Location/Function unit	Board
06	Tube assembly	DX6
07	Easypad user interface (GALILEOS Comfort/GALILEOS Comfort^{PLUS})	DX7
71	Multipad user interface (GALILEOS Compact)	DX71
10	System hardware	DX11/DX1
11	System software	DX11/DX1
12	CAN bus	DX11/DX1
13	Stand peripherals	DX11/DX1
14	Digital extension	DX11/DX1
15	Configuration/update (wrong software, wrong module constellation, etc...)	DX11/DX1
42	Remote control	DX42
89	X-ray detector	DX89

The location may be a DX module number standing for an entire HW function unit, or a logical SW function unit on board DX11 (central control).

5.4.4 General handling of error messages

Error messages must always be acknowledged with the R key.

If trouble-free operation is possible after the error is acknowledged, then no further action is necessary.

If error messages occur again or frequently, or if fault-free operation is not possible, run an error diagnosis (see chapter entitled "Troubleshooting [→ 119]"). In some cases it can be advisable to obtain more information about the history or frequency of the errors from the error logging memory (S007) and from *"SiXABCon"| "Properties"| "More details..."* (see chapter entitled "Opening Extended Details); see also chapter entitled "Error logging memory [→ 119]".

5.5 List of error messages

In the following table, the error codes are sorted by the location or function unit where the error has occurred. For enhanced clarity, the corresponding ID in the error code is printed in bold type.

5.5.1 Location 06: Tube assembly/DX6

Error code	Description	Actions required	see
E6 **06** 01	General error during module initialization	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		If the error occurs repeatedly ... • Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 02	Invalid system data or uninitialized module storage data	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E6 **06** 03	Invalid commanding of control data, CAN bus error This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E6 **06** 04	Data transfer error or dialog error to module (master side)	• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E6 **06** 05	Data transfer error or dialog error to bootloader of module Only occurs in connection with software update.	• Repeat the software update.	S. [→ 47]
		• Check the CAN bus.	S. [→ 121]
		If the error occurs repeatedly or the module is no longer addressable ... • Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 06	Module failed in TTP (detected on master side) This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message. TTP = Time Trigger Protocol	• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E6 **06** 07	TTP timeout error (detected on slave side). The module was temporarily not addressed by the master: • Undervoltage on the master side • Procedure error in the software • Master (DX11) receives no return commanding from the module This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message. TTP = Time Trigger Protocol	• Check the CAN bus.	S. [→ 121]
		• Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams)	
		If 3.3 V present ... • Replace board DX11.	S. [→ 302]
		If 3.3 V is not present ... • Replace board DX1.	S. [→ 302]
		• Check cable L6, replace if necessary.	S. [→ 133] S. [→ 324]
		• Check tube assembly (DX6), replace if necessary.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 08	General fault detected locally on module (slave side). CAN controller being reinitialized.	• Check the CAN bus.	S. [→ 121]
		• Check software versions on the info screen or by running service routine S008.2, perform software update if necessary.	S. [→ 203], S. [→ 47]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E7 **06** 10	Module is stuck in bootloader stage.	• Check board DX6 (note LED states).	S. [→ 127]
		If the board remains in the bootloader stage ... • Repeat the software update.	S. [→ 47]
		• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E7 **06** 12	Unit is not ready for operation This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	• Check the CAN bus.	S. [→ 121]
		If this error occurs in combination with other errors ... • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and observe causal error messages.	
		• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 13	Error when writing to EEPROM. Stored data may be lost.	• Acknowledge error and repeat procedure.	
		If the error occurs repeatedly ... • Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E2 **06** 20	Overtemperature of single tank/ power pack	• Wait until the X-ray tube assembly has cooled down.	
		• Check fan function by running service routine S005.4; replace fan if necessary.	S. [→ 193], S. [→ 277]
		• Check temperature sensor in single tank by running service routine S005.5, replace tube assembly if necessary.	S. [→ 193], S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 21	Hardware signal of release button not detected.	• Check cable L5 (optical fiber), replace if necessary.	S. [→ 133], S. [→ 324]
		• Replace board DX1.	S. [→ 302]
		• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 22	Broken temperature sensor	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E3 **06** 23	Hardware signal of release button applied during power-on.	• Check cable L5: 1. Switch off the unit. 2. Pull cable L5 off tube assembly. 3. Switch unit on. 4. Perform optical check of L5:	
		If light is visible ... • Replace board DX1.	S. [→ 302]
		If no light is visible ... • Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E5 **06** 30	Total radiation time exceeded.	If a CAN bus error had been reported before ...	
		• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E5 **06** 31	Partial radiation time exceeded	If a CAN bus error had been reported before...	
		• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E5 **06** 32	Minimum preheating time not observed.	If a CAN bus error had been reported before...	
		• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E1 **06** 40	Tolerance exceeded VH nom.	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E1 **06** 41	Tolerance exceeded kV nom.	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E1 **06** 42	Tolerance exceeded mA nom.	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E1 **06** 43	Tolerance exceeded VH actual value	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E1 **06** 44	Tolerance exceeded kV actual value	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E1 **06** 45	Tolerance exceeded mA actual value	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 51	VHmax	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 52	MAmax	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 53	KVmax	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 54	Basic heating pulses not applied.	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 55	Anode voltage too low.	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 56	Error during auto-compensation.	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		• Let the tube assembly cool down for approx. 30 mins and repeat this procedure.	
		If the error occurs repeatedly ... • Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 60	TDI signal from board DX11 to board DX6 is disturbed. TDI = Signal to start synchronized readout sequence and to prepare the next exposure	• Replace cable L15. • Replace board DX1. • Replace the tube assembly.	S. [→ 324], S. [→ 302], S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 65	Tube current or tube voltage is too high in standby mode.	• Replace the tube assembly.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 66	Impermissible tube type.	• Check tube type of tube assembly using extended detail query, replace tube assembly if necessary.	S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 67	Light guide input TDI is active during switch-on. TDI = Signal to start synchronized readout sequence and to prepare the next exposure	• Check TDI signal: 1. Switch off the unit. 2. Disconnect cable L15 at board DX11. 3. Switch unit on. 4. Perform visual check at socket J5:	
		• If light is visible: Replace board DX11. • If no light is visible: Replace the tube assembly.	S. [→ 302], S. [→ 268]

Error code	Description	Actions required	see
E6 **06** 68	Tube assembly output after exposure does not match the expected value.	• Replace the tube assembly.	S. [→ 268]

5.5.2 Location 07: Easypad/DX7

Error code	Description	Actions required	see
E6 **07** 01	General error during module initialization	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		If the error occurs repeatedly ... • Replace user interface with electronics (DX7).	S. [→ 265]

Error code	Description	Actions required	see
E6 **07** 02	Invalid system data or uninitialized module storage data	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		• Acknowledge error and repeat procedure.	
		If the error occurs repeatedly ... • Replace user interface with electronics (DX7).	S. [→ 265]

Error code	Description	Actions required	see
E6 **07** 03	Invalid commanding or control data. This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E6 **07** 04	Data transfer error or dialog error to module (master side)	• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E6 **07** 05	Data transfer error or dialog error to bootloader of module Only occurs in connection with software update.	• Repeat the software update.	S. [→ 47]
		• Check the CAN bus.	S. [→ 121]
		• Replace user interface with electronics (DX7).	S. [→ 265]

Error code	Description	Actions required	see
E6 **07** 06	Module failed in TTP (detected on master side). This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message. TTP = Time Trigger Protocol	• Check the CAN bus.	S. [→ 121]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		• Replace user interface with electronics (DX7).	S. [→ 265]

Error code	Description	Actions required	see
E6 **07** 07	TTP timeout error (detected on slave side). The module was temporarily not addressed by the master: • Undervoltage on the master side • Procedure error in the software • Master (DX11) receives no return commanding from the module This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message. TTP = Time Trigger Protocol	• Check the CAN bus.	S. [→ 121]
		• Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams)	
		If 3.3 V is present ... • Replace board DX11.	S. [→ 302]
		If 3.3 V is not present ... • Replace board DX1.	S. [→ 302]

Error code	Description	Actions required	see
E6 **07** 08	General fault detected locally on module (slave side). CAN controller being reinitialized.	• Check the CAN bus.	S. [→ 121]
		• Check software versions on the info screen or by running service routine S008.2, perform software update if necessary.	S. [→ 203], S. [→ 47]
		• Replace user interface with electronics (DX7).	S. [→ 265]
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E7 **07** 10	Module is stuck in bootloader stage.	• Check user interface with electronics (DX7) (note LED states).	
		If the board remains in the bootloader stage ... • Repeat the software update.	S. [→ 47]
		• Replace user interface with electronics (DX7).	S. [→ 265]

Error code	Description	Actions required	see
E7 **07** 12	Unit is not ready for operation Therefore, the error can only be displayed on the remote control (DX42).	• Check the CAN bus.	S. [→ 121]
		This error is a sequential fault. • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and observe causal error messages.	

Error code	Description	Actions required	see
E6 **07** 20	Contact to DX11 interrupted during operation.	• Note error message on remote control (DX42) and check log memory (via extended details).	S. [→ 70]
		• Check the CAN bus.	S. [→ 121]
		• Check cable L9, replace if necessary.	S. [→ 133], S. [→ 324]

Error code	Description	Actions required	see
E7 **07** 21	No CAN bus connection. DX11 does not start. Occurs in the start screen after power-on.	• Start the detail query via SiXABCon.	
		If DX11 responds ... • Check the signal path to DX7, repair or replace cables/connectors if necessary. • Replace board DX1.	S. [→ 324], S. [→ 302]
		If DX11 does not respond ... • Replace board DX11.	S. [→ 302]

Error code	Description	Actions required	see
E3 **07** 30	Up/down keys pressed on power-on.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and observe causal error messages. If the error occurs repeatedly ... • Replace user interface with electronics (DX7).	S. [→ 265]
E3 **07** 33	Light localizer key pressed during power-on.		
E3 **07** 34	T key pressed during power-on.		
E3 **07** 35	R key pressed during power-on.		
E3 **07** 36	Touchscreen pressed during power-on.		

Error code	Description	Actions required	see
E7 **07** 40	No valid language set found.	Check selected language set by running service routine S017.5, correct if necessary.	S. [→ 222]
		Check whether selected language set is already installed, perform software update if necessary.	S. [→ 47]
		Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

5.5.3 Location 10: System hardware

Error code	Description	Actions required	see
E7 **10** 01	EEPROM cannot be written.	• Acknowledge error and repeat procedure.	
		If the error occurs repeatedly ... • Replace board DX11.	S. [→ 305]

Error code	Description	Actions required	see
E7 **10** 02	FPGA of DX1 is not addressable. FPGA = Field Programmable Gate Array	• Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E1 **10** 03	The flash file system must be formatted. Occurs after replacement of board DX11.	• Acknowledge error and repeat procedure. The flash file system is formatted and error code E110 04 is displayed.	

Error code	Description	Actions required	see
E1 **10** 04	Flash file system formatting in progress.	• Wait until the error code automatically disappears (approx. 2 - 3 mins).	

Error code	Description	Actions required	see
E1 **10** 05	Flash file system is not ready for operation.	• Execute service routine S009.4 and format flash file system. The contents of the error memory are thus lost.	S. [→ 205]
		If the error occurs repeatedly ... • Replace board DX11.	S. [→ 305]

Error code	Description	Actions required	see
E7 **10** 06	Incompatible DX1-FPGA (programmable logic component) version for current operating mode.	• Check the hardware version of DX1 for compatibility, replace board DX1 if necessary.	S. [→ 303]

Error code	Description	Actions required	see
E1 **10** 07	The unit is not ready for operation. Following longer periods of disuse (> 200 h), a preparation time of up to ten minutes is required for the sensor after the unit is switched on. During this period, the message "Sensor being prepared" or S150 is displayed. During this time the unit is not ready for operation. If exposure readiness is reached during this time, error message E1 10 07 appears.	If this error is displayed after a longer period of disuse and the attainment of exposure readiness ... • Acknowledge the error and wait until the "Sensor being prepared" message goes out. If this error is displayed without attainment of exposure readiness ... • Check cable L13 between board DX11 and board DX89, replace if necessary. • Check cable L28* between the camera head and board DX89 (in the X-ray detector), replace if necessary. • Check cable L27 (in the X-ray detector), replace if necessary. • Replace board DX89. • Replace board DX1. • Replace the X-ray detector. • Replace board DX11.	S. [→ 133], S. [→ 324], S. [→ 279]

* As of X-ray detector serial number 5000, cable L28 can no longer be replaced individually.

Error code	Description	Actions required	see
E5 **10** 09	The FaceScan system cannot be addressed.	• Check the FaceScan configuration on the PC using service routine S017.2. • Check the cabling connected to the FaceScan system (preferably between the FaceScanner and POE module). • Check POE module and replace if necessary.	S., S. [→ 133], S. [→ 294]

Error code	Description	Actions required	see
E5 **10** 10	The FaceScan system is not ready for exposure.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		If the error occurs repeatedly: • Please report this event to the Customer Service Center to help us improve the product.	

Error code	Description	Actions required	see
E1 **10** 20	Board DX11 does not have valid data about the X-ray detector.	• Perform service routine S009.7 (copy data from DX89 to board DX11).	S. [→ 209], S. [→ 145]
E1 **10** 21	Board DX11 does not have valid data about board DX89.	• Perform service routine S009.7 (copy data from DX89 to board DX11).	
E1 **10** 22	X-ray detector was replaced and must be registered in the system.	• Perform service routine S009.7 (copy data from DX89 to board DX11). • Calibrate the unit.	

Error code	Description	Actions required	see
E1 **10** 23	Board DX89 does not have valid data via the X-ray detector.	• Perform service routine S009.7 (copy data from DX11 to board DX89).	S. [→ 209], S. [→ 279]
E1 **10** 24	The X-ray detector has been replaced. Board DX89 does not have valid data via the X-ray detector. This error message should not occur in the application.	• Replace the X-ray detector. Please report this event to the Customer Service Center to help us improve the product.	
E1 **10** 25	Board DX89 was replaced and must be registered in the system.	• Perform service routine S009.7 (copy data from DX11 to board DX89).	
E1 **10** 26	The X-ray detector has not been initialized. Board DX89 does not have valid data via the X-ray detector. This error message should not occur in the application.	• Replace the X-ray detector. Please report this event to the Customer Service Center to help us improve the product.	

5.5.4 Location 11: Power PC/Board DX11

Error code	Description	Actions required	see
E6 **11** 01	Program sequence error.	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		• Acknowledge error and repeat procedure.	
		If the error occurs again ...	
		• Reset the entire calibration of the unit and readjust the unit.	S. [→ 145]
		• Replace board DX11.	S. [→ 305]

Error code	Description	Actions required	see
E6 **11** 02	Watchdog error	• Acknowledge error and repeat procedure.	
		If the error occurs repeatedly ...	S. [→ 305]
		• Replace board DX11.	

Error code	Description	Actions required	see
E6 **11** 03	Operating system/resource error.	• Acknowledge error and repeat procedure.	
		If the error occurs repeatedly ... • Replace board DX11.	S. [→ 305]

Error code	Description	Actions required	see
E7 **11** 04	Implausible data in EEPROM.	• Check the unit configuration via service routines S017 and S018 and reconfigure if necessary.	S. [→ 218], S. [→ 232]
		• Check calibration with diaphragm test exposures.	S.
		If the calibration is not OK ... • Recalibrate the unit.	S. [→ 145]
		If the calibration is OK ... • Make the individual unit settings again (e.g. programming of the patient symbol keys; see Operating Instructions).	

Error code	Description	Actions required	see
E6 **11** 05	RAM allocation failed.	• Replace board DX11.	S. [→ 305]

Error code	Description	Actions required	see
E7 **11** 07	Unknown or invalid definition of unit class. Occurs during first power-on after replacement of board DX6 or DX11.	• Take the action required after replacing a board.	S. [→ 306]

Error code	Description	Actions required	see
E7 **11** 08	The installed control panel does not match the unit.	• Install the appropriate user interface for the unit.	S. [→ 265]

Error code	Description	Actions required	see
E5 **11** 09	Internal error in program sequence of board DX11.	• Acknowledge error and repeat procedure.	
		If the error occurs repeatedly ... • Perform a software update (bug fix).	S. [→ 47]

Error code	Description	Actions required	see
E7 **11** 11	Wrong unit configuration.	• Check the unit configuration by running service routine S017.2 and reconfigure if necessary.	S.

Error code	Description	Actions required	see
E7 **11** 12	Internal error in data management of board DX11.	If the error occurs after a module has been replaced ... • Query *"More details..."* with SiXABCon and seek advice from the Sirona Customer Service Center on how to proceed.	S. [→ 70]
		If no module has been replaced ... • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure	
		• Check software versions on the info screen or by running service routine S008.2, perform software update if necessary.	S. [→ 203], S. [→ 47]
		If the error occurs repeatedly ... • Perform a software update (bug fix).	S. [→ 47]

Error code	Description	Actions required	see
E7 **11** 14	Wrong remote control for this unit. This error message blocks all unit functions. To continue to work with this unit, you must unplug the remote control and restart the unit.	• Install the correct remote control. • If necessary, obtain a new remote control from the manufacturer. A remote control for another Sirona unit or a third-party manufacturer unit may have been connected.	

Error code	Description	Actions required	see
E7 **11** 15	A diaphragm not suitable for the diaphragm configuration was detected by the unit.	• Run service routine S017.25 to modify the diaphragm configuration as appropriate for the installed diaphragm.	S.

Error code	Description	Actions required	see
E1 **11** 19	No image data available.	• Check TDI signal (synchronized readout sequence)/cable L13, replace cable L13 if necessary.	S. [→ 324]
		• Replace board DX89.	S. [→ 303]
		• Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E1 **11** 20	The calibration data on the unit is invalid or does not match the serial numbers of the modules.	• Calibrate the unit.	S. [→ 145]
		If the error occurs again and no modules were replaced ... • Replace board DX11.	S. [→ 303]
		If the error occurs again and modules were replaced ... • This error is a sequential fault. watch for additional causal error messages and take the respective action.	

Error code	Description	Actions required	see
E2 **11** 22	The default iris table is write-protected.	• Check the software versions of SIDEXIS XG and the unit for compatibility, perform software update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E1 **11** 23	No matching iris diaphragm setting is available for the current program parameters.	• Check the software versions of SIDEXIS XG and the unit for compatibility, perform software update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E7 **11** 24	**NOTICE! This message can only appear for the GALILEOS Comfort PLUS.** The installed X-ray detector cannot be operated on this unit.	• Check the serial number of the X-ray detector. **NOTICE! The serial number of the X-ray detector must be ≥ 6000 for the GALILEOS Comfort PLUS.** • Replace the X-ray detector if necessary.	S. [→ 279]

Error code	Description	Actions required	see
E1 **11** 88	The unit is in demo mode. Occurs when the unit is switched on.	If user mode is expressly required ... • Switch the demo mode off. **CAUTION! Radiation can be released after the demo mode is switched off!**	S. [→ 74]

5.5.5 Location 12: CAN bus

Error code	Description	Actions required	see
E6 **12** 01	CAN controller initialization error on DX1.	• Check the CAN bus.	S. [→ 121]

Error code	Description	Actions required	see
E6 **12** 02	CAN malfunction (cannot be assigned to module).	• Check the CAN bus.	S. [→ 121]

5.5.6 Location 13: Stand/Peripherals

Error code	Description	Actions required	see
E4 **13** 04	Actuator 1; position counter error.	• Restart the unit: **1.** Switch off the unit. **2.** Wait 1 minute. **3.** Switch unit on. **4.** Repeat procedure	
		If the error occurs repeatedly ... • Check the swivel arm connection on board DX1.	

Error code	Description	Actions required	see
E4 **13** 21	Ring motor has not reached home position.	• Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary.	S. [→ 261]
		• Check light barrier V1_3 (X804), replace if necessary.	S. [→ 132], S. [→ 302]
		• Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E4 **13** 22	Ring motor has not left home position.	• Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary.	S. [→ 261]
		• Check light barrier V1_3 (X804), replace if necessary.	S. [→ 132], S. [→ 302]
		• Replace board DX1.	S. [→ 304]

Error code	Description	Actions required	see
E5 **13** 23	Malfunction of ring motor during operation.	• Acknowledge error.	
		If the error occurs again ... • Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E4 **13** 24	Ring motor; position counter error.	• Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary.	S. [→ 261]
		• Check light barrier V1_3 (X804), replace if necessary.	S. [→ 132], S. [→ 302]
		• Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E6 **13** 27	Ring motor is not ready for operation.	This error is a sequential fault. • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and observe causal error messages.	

Error code	Description	Actions required	see
E6 **13** 28	Error when activating ring motor.	This error is a sequential fault. • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and observe causal error messages.	
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

Error code	Description	Actions required	see
E4 **13** 29	Inaccurate start position at the start of exposure.	• Check the ring drive mechanism manually for smooth and easy running, replace the ring motor or mechanism if necessary.	S. [→ 261]
		• Check light barrier V1_3 (X804), replace if necessary.	S. [→ 132], S. [→ 302]

Error code	Description	Actions required	see
E4 **13** 30	No height adjustment motor pulses.	• Check cable L16 (X402), replace if necessary.	S. [→ 133], S. [→ 324]
		• Check board DX1, replace if necessary.	S. [→ 127], S. [→ 303]
		• Check filter between height adjustment motor and L16 (acc. to circuit diagram on filter) (current and voltage), replace if necessary.	
		• Check height adjustment motor incl. pulse generator, replace if necessary.	S. [→ 131], S. [→ 250]
		• Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E5 **13** 31	Unit has traveled to upper limit switch.	• Check max. travel height with service routine S018.2, adjust if necessary.	S. [→ 232]
		• Run HA motor in the other direction with the Up/Down keys and reference (value approx. 1,500).	
		• Check light barriers V1_4, replace if necessary.	S. [→ 132], S. [→ 302]
		• Check height adjustment motor for overtravel, replace board DX1 if necessary.	S. [→ 332] S. [→ 303]
		If the error occurs again ... • Check the limit switch or wiring, correct or replace the limit switch as necessary.	

Error code	Description	Actions required	see
E5 **13** 32	Unit has traveled to lower limit switch.	• Run HA motor in the other direction with the Up/Down keys and reference (value approx. 1,500).	
		• Check light barriers V1_4, replace if necessary.	S. [→ 132], S.
		• Check height adjustment motor for overtravel, replace board DX1 if necessary.	S. [→ 332], S. [→ 303]
		If the error occurs again ... • Check the limit switch or wiring, correct or replace the limit switch as necessary.	

Error code	Description	Actions required	see
E5 **13** 33	Height adjustment motor position counter too small for current position. Error may occur after replacement of board (DX11).	• Run HA motor in the other direction with the Up/Down keys and reference (value approx. 1,500).	
		• Check max. travel height with service routine S018.2, adjust if necessary.	S. [→ 232]
		• Check light barriers V1_4, replace if necessary.	S. [→ 132], S.

Error code	Description	Actions required	see
E5 **13** 34	Height adjustment motor position counter too large for current position. Error may occur after replacement of board (DX11).	• Run HA motor in the other direction with the Up/Down keys and reference (value approx. 1,500).	
		• Check light barriers V1_4, replace if necessary. **Tip:** As an aid, the current switching state can be queried with service routine S018.4.	S. [→ 132], S., S. [→ 234]

Error code	Description	Actions required	see
E5 **13** 35	Height adjustment motor; wrong direction of rotation.	• Check connector assignment on filter or in front of HA motor, correct if necessary.	
		• Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E5 **13** 36	Software signal from key applied but hardware signal is missing.	• Check cables L9 and L10, replace if necessary.	S. [→ 133], S. [→ 324]
		• Check limit switches SE1_1 and SE1_2, replace if necessary.	
		• Replace Easypad.	S. [→ 265]

Error code	Description	Actions required	see
E7 **13** 37	Overtravel of HA motor occurs or height adjustment power transistor defective.	• Check height adjustment motor for overtravel, replace board DX1 if necessary.	S. [→ 332], S. [→ 303]
		• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		• Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E6 **13** 38	Height adjustment motor is not ready for operation.	This error is a sequential fault. • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and observe causal error messages.	

Error code	Description	Actions required	see
E6 **13** 39	Error when activating height adjustment motor.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		• Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E3 **13** 40	Release signal applied during power-on.	• Restart the unit: **1.** Switch off the unit. **2.** Wait 1 minute. **3.** Switch unit on. **4.** Repeat procedure and observe causal error messages.	
		If the error occurs repeatedly ... • Check the X-ray signal path.	S. [→ 135]

Error code	Description	Actions required	see
E3 **13** 41	Release signal not applied on DX11.	• Check signal path for interruption according to wiring diagrams, replace component if necessary.	
		• Run service routine S017.6 to deactivate remote control. • Connect release button directly to board DX41 (instead of using cable L17) and check for proper functioning.	S.
		• Check release button.	
		If the release button is functioning ... • Check cable L17, replace if necessary.	S. [→ 133], S. [→ 324]

Error code	Description	Actions required	see
E6 **13** 42	The hardware signal for radiation release is applied on board DX1 during unit operation although no actuated X-ray release button is being reported via the CAN bus.	• Check the X-ray signal path.	S. [→ 135]

Error code	Description	Actions required	see
E5 **13** 43	The door was opened during the exposure.	• Check the X-ray signal path.	S. [→ 135]

Error code	Description	Actions required	see
E5 **13** 44	Swivel arm was opened during the exposure.	• Close swivel arm.	
		• Check light barrier V1_2, replace if necessary.	S. [→ 132], S. [→ 302]
		• Check cable L29, replace if necessary.	S. [→ 133], S. [→ 324]

Error code	Description	Actions required	see
E5 **13** 73	Malfunction of height adjustment during operation.	• Acknowledge error.	
		• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		If the error occurs repeatedly ... • Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E5 **13** 83	Error while generating pulse for sensor.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		If the error occurs repeatedly ... • Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E6 **13** 87	Error when activating pulse generation.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]

5.5.7 Location 14: Digital extension, SIDEXIS XG

Error code	Description	Actions required	see
E5 **14** 01	Abort by SIDEXIS XG.	• Check network connection, XG3D plugin installation and software version.	

Error code	Description	Actions required	see
E7 **14** 02	Interface version not compatible with SIDEXIS XG.	• Check the software versions of the unit (S008.2) and XG3D plugin and perform software update if necessary.	S. [→ 203]

Error code	Description	Actions required	see
E5 **14** 04	The network connection was interrupted. This error often occurs if SIDEXIS XG is selected before the unit is ready for selection.	• Acknowledge error and quit service domain on unit and in SIDEXIS XG. • Restart the unit: **1.** Switch off the unit. **2.** Wait 1 minute. **3.** Switch unit on. **4.** Repeat procedure and check function.	
		If the error occurs repeatedly ... • Perform network diagnosis with the support of the Sirona Customer Service Center (CSC) and check the setting of the network card if necessary, again seeking assistance from the Sirona Customer Service Center. (Checksum offload for patient names with 15 characters with several network cards (preferably for onboard systems).) • Check and, if necessary, replace network components (PC network card, Cat5 cable, hub/switch/router, media converter, L25/26). • Check the software versions of the unit (on the info screen or by running service routine S008.2) and XG3D_plugin, and perform software update if necessary.	S. [→ 203], S. [→ 47]

Error code	Description	Actions required	see
E6 **14** 05	Service of DHCP server is not available.	• Have network configuration of dental practice checked by the administrator in charge. • Ensure proper functioning of the DHCP server.	

Error code	Description	Actions required	see
E6 **14** 06	The bootline of board DX11 had to be preassigned with default values.	• Reconfiguration of network data via SiXABCon required.	

Error code	Description	Actions required	see
E6 **14** 07	The IP address of the unit could not be set correctly.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		If the error occurs repeatedly ... • Contact Sirona Customer Service Center.	

Error code	Description	Actions required	see
E6 **14** 10	Clock signals for sensor image transfer not received on board DX1/ DX11 (...10).	• Check cable L13 for crushed spots and kinks and check connectors, repair or replace if necessary.	S. [→ 324]
E6 **14** 12	Faulty detection of sensor image transfer data signals on board DX1/ DX11; recurring (...12).	• Check board DX89, replace if necessary.	S. [→ 127], S. [→ 303]

5.5.8 Location 15: Configuration, update

Error code	Description	Actions required	see
E7 **15** 01	Wrong memory modules.	If a DRAM memory module is plugged into board DX11 ... • Replace memory module or DX11.	S. [→ 305]
		If no DRAM memory module is plugged into board DX11 ... • Replace board DX11.	S. [→ 305]

Error code	Description	Actions required	see
E7 **15** 03	Wrong software constellation of modules.	• Check the software versions of the unit (on the info screen or by running service routing S008.2), and run or repeat software update or downgrade if necessary.	S. [→ 203], S. [→ 47]

Error code	Description	Actions required	see
E6 **15** 04	Product activation keys invalid or not available. Occurs after replacement of tube assembly (DX6) or board DX11 and possibly after software updates. See also the section titled Measures following replacement of boards [→ 306].	• Enter release key.	see OI*

*) OI = Operating instructions

Error code	Description	Actions required	see
E6 **15** 05	Unit serial number invalid or not available. Occurs during first power-on after replacement of board DX6 or DX11. See also the section titled Measures following replacement of boards [→ 306].	• Run service routine S008.3 and confirm or enter the unit serial number on the unit.	S. [→ 203]

Error code	Description	Actions required	see
E6 **15** 10	Update file for module is corrupt.	• Obtain latest update file from the Sirona Customer Service Center (CSC) or the Sirona home page and perform software update.	S. [→ 47]

5.5.9 Location 42: Remote control

Error code	Description	Actions required	see
E6 **42** 01	General module initialization error. Error generated during module self-test.	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary. • Replace board DX42.	S. [→ 47], S. [→ 303]

Error code	Description	Actions required	see
E6 **42** 02	Invalid system data or uninitialized module storage data	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary. • Acknowledge error and repeat procedure.	S. [→ 47]
		If the error occurs repeatedly ... • Replace board DX42.	S. [→ 303]

Error code	Description	Actions required	see
E6 **42** 03	Invalid commanding or control data This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	• Run service routine S008.2 to check software version of DX42 (in relation to main software releases), perform software update if necessary. • Check the CAN bus. • Check the signal path from board DX1 to board DX42, replace module DX42 if necessary. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 203], S. [→ 47], S. [→ 121], S. [→ 303]

Error code	Description	Actions required	see
E6 **42** 04	Data transfer error or dialog error to module (master side)	• Check the CAN bus. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121], S. [→ 47]

Error code	Description	Actions required	see
E6 **42** 05	Data transfer error or dialog error to bootloader of module Only occurs in connection with a software update	• Repeat the software update. • Check the CAN bus. • Replace board DX42.	S. [→ 47], S. [→ 121], S. [→ 303]

Error code	Description	Actions required	see
E6 **42** 06	Module failed in TTP (detected on master side). TTP = Time Trigger Protocol	• Check the CAN bus. • Check the signal path from board DX1 to board DX42, replace module if necessary • Replace board DX42. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121], S. [→ 303], S. [→ 47]

Error code	Description	Actions required	see
E6 **42** 07	TTP timeout error (detected on slave side) The module was temporarily not addressed by the master: Undervoltage on the master side Procedure error in the software Master (DX11) receives no return commanding from the module This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message. TTP = Time Trigger Protocol	• Check the CAN bus. • Check power supply (3.3 V) of board DX11, replace board DX1 or DX11 if necessary. • Check the signal path from board DX1 to board DX42, replace module if necessary • Replace board DX42.	S. [→ 121], S. [→ 303]

Error code	Description	Actions required	see
E6 **42** 08	General fault detected locally on module (slave side). CAN controller being reinitialized. Occurs if software of boards is incompatible.	• Check software versions on the info screen or by running service routine S008.2, perform software update if necessary. • Check the CAN bus. • Replace board DX42. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 203], S. [→ 47], S. [→ 121], S. [→ 303]

Error code	Description	Actions required	see
E7 **42** 10	Module is stuck in bootloader stage.	• Check board DX42 (note LED states).	S. [→ 127]
		If the board remains in the bootloader stage ... • Repeat the software update. • Replace remote control, see Installation Instructions.	S. [→ 47]

Error code	Description	Actions required	see
E7 **42** 12	Unit is not ready for operation	This error is a sequential fault. • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch on the unit, making sure that the release button is not pressed during booting. 4. Repeat procedure and check function.	
		If the error occurs repeatedly ... • Repeat procedure and observe causal error messages. • Check the signal path from board DX1 to board DX42, replace module if necessary	S. [→ 303]

Error code	Description	Actions required	see
E6 **42** 20	Contact to DX11 interrupted during operation.	• Check the signal path from board DX1 to board DX42, replace module if necessary • Check connection of remote control, see Installation Instructions. • Check the CAN bus. • Check cable L17, replace if necessary. • Check board DX42, replace if necessary. • Check board DX41, replace if necessary. **Tip:** If the error cannot be eliminated immediately, the unit can be temporarily reconfigured and operated with a release button located directly on it (see Installation Instructions).	S. [→ 303], S. [→ 121], S. [→ 133], S. [→ 324], S. [→ 127], S. [→ 303]

Error code	Description	Actions required	see
E7 **42** 21	No CAN bus connection. DX11 does not start. Occurs in the start screen after power-on.	• Check configuration (with or without DX41) by running service routine S017.9, correct the configuration if necessary. • Check the signal path from board DX1 to board DX42, replace module if necessary • Check the CAN bus. • Check remote control by running service routine S017.6, configure if necessary. • Start the detail query via SiXABCon.	S. [→ 303], S. [→ 303], S. [→ 121], S., S. [→ 70]
		If board DX11 responds ... • Check the signal path to DX42, repair or replace cables/connectors if necessary. • Replace DX1.	S. [→ 324], S. [→ 303]
		If DX11 does not respond ... • If error persists: Replace board DX11.	S. [→ 303]

Error code	Description	Actions required	see
E3 **42** 30	R key pressed during power-on.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch on the unit, making sure that the remote control is not pressed during booting. 4. Repeat procedure and check function.	
		If the error occurs repeatedly ... • Replace remote control, see Installation Instructions.	

Error code	Description	Actions required	see
E3 **42** 31	Release button pressed during power-on. The hardware signal for radiation release is applied on board DX42 when the unit is switched on.	• see section Error analysis of X-RAY control signal path [→ 135].	S. [→ 135]

5.5.10 Location 71: Multipad, board DX71

Error code	Description	Actions required	see
E6 **71** 01	General error during module initialization	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 47]
		If the error occurs repeatedly ... • Replace board DX71 or Multipad.	S. [→ 303], S. [→ 265]

Error code	Description	Actions required	see
E6 **71** 02	Invalid system data or uninitialized module storage data	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary. • Acknowledge error and repeat procedure.	S. [→ 47]
		If the error occurs repeatedly ... • Replace board DX71 or Multipad.	S. [→ 303], S. [→ 265]

Error code	Description	Actions required	see
E6 **71** 03	Invalid commanding or control data. This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	• Check the CAN bus. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121] S. [→ 47]

Error code	Description	Actions required	see
E6 **71** 04	Data transfer error or dialog error to module (master side)	• Check the CAN bus. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121] S. [→ 47]

Error code	Description	Actions required	see
E6 **71** 05	Data transfer error or dialog error to bootloader of module Only occurs in connection with software update.	• Repeat the software update. • Check the CAN bus. • Replace board DX71 or Multipad.	S. [→ 47], S. [→ 121], S. [→ 303], S. [→ 265]

Error code	Description	Actions required	see
E6 **71** 06	Module failed in TTP (time trigger protocol) (detected on master side)	• Check the CAN bus. • Replace board DX71. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121], S. [→ 303], S. [→ 47]

Error code	Description	Actions required	see
E6 **71** 07	TTP (time trigger protocol) timeout error (detected on slave side) The module was temporarily not addressed by the master: Undervoltage on the master side Procedure error in the software Master (DX11) receives no return commanding from the module This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	• Check the CAN bus. • Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams).	S. [→ 121]
		If 3.3 V is present ... • Replace board DX11.	S. [→ 303]
		If 3.3 V is not present ... • Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E6 **71** 08	General fault detected locally on module (slave side). CAN controller being reinitialized.	• Check the CAN bus. • Check software versions on the info screen or by running service routine S008.2, perform software update if necessary. • Replace board DX71 or Multipad. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121], S. [→ 203], S. [→ 47], S. [→ 303], S. [→ 265]

Error code	Description	Actions required	see
E7 **71** 10	Module is stuck in bootloader stage.	• Check board DX71.	S. [→ 127]
		If the board remains in the bootloader stage ... • Repeat the software update. • Replace board DX71 or Multipad.	S. [→ 47], S. [→ 303], S. [→ 265]

Error code	Description	Actions required	see
E7 **71** 12	Unit is not ready for operation	• Check the CAN bus. This error is a sequential fault. • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and observe causal error messages.	S. [→ 121]

Error code	Description	Actions required	see
E6 **71** 20	Contact to DX11 interrupted during operation.	• Note error message on remote control (DX42) and check log memory (via extended details). • Check the CAN bus. • Check cable L9, replace if necessary.	S. [→ 119], S. [→ 121], S. [→ 133], S. [→ 324]

Error code	Description	Actions required	see
E7 **71** 21	No CAN bus connection. DX11 does not start. Occurs in the start screen after power-on.	• Start the detail query via SiXABCon.	S. [→ 70]
		If board DX11 responds ... • Check the signal path to DX71, repair or replace cables/connectors if necessary. • Replace board DX1.	S. [→ 324], S. [→ 303]
		If board DX11 does not respond ... • Replace board DX11.	S. [→ 303]

Error code	Description	Actions required	see
E3 **71** 30	Up/down keys pressed on power-on.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit ON, making sure that the Multipad is not actuated during boot-up. 4. Repeat procedure and check function.	
E3 **71** 33	Light localizer key pressed during power-on.		
E3 **71** 34	T key pressed during power-on.		
E3 **71** 35	R key pressed during power-on.		
E3 **71** 36	Service key actuated during power-on.	If the error occurs repeatedly ... • Replace board DX71 or Multipad.	S. [→ 303], S. [→ 265]
E3 **71** 37	Memory key actuated during power-on.		
E3 **71** 38	Program selection key actuated during power-on.		
E3 **71** 39	Radiation time key actuated during power-on.		
E3 **71** 40	kV/mA key actuated during power-on.		
E3 **71** 41	Patient symbol pressed during power-on.		

5.5.11 Location 89: X-ray detector

Error code	Description	Actions required	see
E6 **89** 01	General error during module initialization	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary. • Check cable L27/L28*, replace if necessary. • Check board DX89, replace if necessary. • Check x-ray detector, replace if necessary.	S. [→ 47], S. [→ 133], S. [→ 324], S. [→ 127], S. [→ 303], S. [→ 279]

* As of X-ray detector serial number 5000, cable L28 can no longer be replaced individually.

Error code	Description	Actions required	see
E6 **89** 02	Invalid system data or uninitialized module storage data	• Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary. • Acknowledge error and repeat procedure.	S. [→ 47]
		If the error occurs repeatedly ... • Check cable L27/L28*, replace if necessary. • Check board DX89, replace if necessary. • Check x-ray detector, replace if necessary.	S. [→ 133], S. [→ 324], S. [→ 127], S. [→ 303], S. [→ 279]

* As of X-ray detector serial number 5000, cable L28 can no longer be replaced individually.

Error code	Description	Actions required	see
E6 **89** 03	Invalid commanding or control data. This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	• Check the CAN bus. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121], S. [→ 47]

Error code	Description	Actions required	see
E6 **89** 04	Data transfer error or dialog error to module (master side)	• Check the CAN bus. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121], S. [→ 47]

Error code	Description	Actions required	see
E6 **89** 05	Data transfer error or dialog error to bootloader of module Only occurs in connection with software update	• Repeat the software update. • Check the CAN bus. • Check x-ray detector, replace if necessary.	S. [→ 47], S. [→ 121], S. [→ 279]

Error code	Description	Actions required	see
E6 **89** 06	Module failed in TTP (time trigger protocol) (detected on master side).	• Check the CAN bus. • Check x-ray detector, replace if necessary. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121], S. [→ 279], S. [→ 47]

Error code	Description	Actions required	see
E6 **89** 07	TTP (time trigger protocol) timeout error (detected on slave side) The module was temporarily not addressed by the master: • Undervoltage on the master side • Procedure error in the software • Master (DX11) receives no return commanding from the module This error may also occur in connection with other causal error messages! Please also observe the causal error message! It appears only after you acknowledge the first error message.	• Check the CAN bus. • Check cable L13, replace if necessary. • Check power supply of board DX11; measuring point 3.3 V on board DX1 (see wiring diagrams).	S. [→ 121], S. [→ 133], S. [→ 324]
		If 3.3 V present... • Replace board DX11.	S. [→ 303]
		If 3.3 V not present... • Replace board DX1.	S. [→ 303]

Error code	Description	Actions required	see
E6 **89** 08	General fault detected locally on module (slave side). CAN controller being reinitialized.	• Check the CAN bus. • Check software versions on the info screen or by running service routine S008.2, perform software update if necessary. • Check board DX89, replace if necessary. • Please contact the Sirona Customer Service Center (CSC) to find out whether a bug fix by means of a software update is possible and perform such an update if necessary.	S. [→ 121], S. [→ 203], S. [→ 47], S. [→ 127], S. [→ 303]

Error code	Description	Actions required	see
E7 **89** 10	Module is stuck in bootloader stage.	• Check operating status of board (note LED states).	S. [→ 127]
		If the board remains in the bootloader stage ... • Run software update. • Check board DX89, replace if necessary.	S. [→ 47], S. [→ 127], S. [→ 303]

Error code	Description	Actions required	see
E7 **89** 12	Unit is not ready for operation	This error is a sequential fault. • Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		If the error occurs repeatedly... • Repeat procedure and observe causal error messages.	

Error code	Description	Actions required	see
E5 **89** 13	Error when writing to EEPROM **IMPORTANT:** Stored data may be lost.	• Acknowledge error and repeat procedure. • Run software update.	S. [→ 47]
		If the error occurs again ... • Check log memory (via extended details). • Check x-ray detector, replace if necessary.	S. [→ 70], S. [→ 279]

Error code	Description	Actions required	see
E6 **89** 20	Faulty voltage supply of DX89.	• Check cable L13, replace if necessary.	S. [→ 133], S. [→ 324]

Error code	Description	Actions required	see
E6 **89** 21	File system error.	• Check board DX89, replace if necessary.	S. [→ 127], S. [→ 303]

Error code	Description	Actions required	see
E5 **89** 22	The power supply of the X-ray detector does not respond or is the wrong version.	• Check board DX89, replace if necessary.	S. [→ 127], S. [→ 303]
		• Check x-ray detector, replace if necessary.	S. [→ 279]

Error code	Description	Actions required	see
E5 **89** 23	Camera head in the X-ray detector does not respond or wrong version.	• Check cable L27/L28*, replace if necessary.	S. [→ 133], S. [→ 324]
		• Check board DX89, replace if necessary.	S. [→ 127], S. [→ 303]
		• Check x-ray detector, replace if necessary.	S. [→ 279]

* As of X-ray detector serial number 5000, cable L28 can no longer be replaced individually.

Error code	Description	Actions required	see
E7 **89** 25	Image memory error.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		• Run software update.	S. [→ 47]
		• Check that the memory modules on board DX89 are firmly fixed, replace board DX89 if necessary.	S. [→ 303]

Error code	Description	Actions required	see
E7 **89** 26	Total exposure time was exceeded.	• Check cable L13 (CAN bus), replace if necessary.	S. [→ 133], S. [→ 324]

Error code	Description	Actions required	see
E7 **89** 27	At least 10 image segments are defective.	• Check cable L13 (CAN bus), replace if necessary.	S. [→ 133], S. [→ 324]
		If the error occurs repeatedly ...	S. [→ 127],
		• Check board DX89, replace if necessary.	S. [→ 303],
		• Replace the X-ray detector.	S. [→ 279]

Error code	Description	Actions required	see
E7 **89** 28	FPGA (field programmable gate array) on board DX89 is defective or does not respond.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		If the error occurs repeatedly ... • Run software update. • Replace board DX89.	S. [→ 47], S. [→ 303]

Error code	Description	Actions required	see
E7 **89** 29	Memory test error during system boot-up.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		If the error occurs repeatedly ... • Check that the memory modules on board DX89 are firmly fixed, replace board DX89 if necessary.	S. [→ 303]

Error code	Description	Actions required	see
E7 **89** 30	Flash memory component does not respond.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		If the error occurs repeatedly ... • Replace board DX89.	S. [→ 303]

Error code	Description	Actions required	see
E6 **89** 32	TDI (Signal to start synchronized readout sequence and to prepare the next exposure) pulses not detected during the exposure.	• Check cable L13, replace if necessary.	S. [→ 133], S. [→ 324]
		• Check board DX89, replace if necessary.	S. [→ 127], S. [→ 303]
		• Check board DX1, replace if necessary.	S. [→ 127], S. [→ 303]

Error code	Description	Actions required	see
E6 **89** 33	Board DX89 has detected an image signal at the wrong point of time.	• Check cable L13, replace if necessary.	S. [→ 133], S. [→ 324]
		• Check board DX89, replace if necessary.	S. [→ 127], S. [→ 303]
		• Check board DX1, replace if necessary.	S. [→ 127], S. [→ 303]

Error code	Description	Actions required	see
E1 **89** 34	X-ray detector voltages inaccurate.	• Check cable L27 (DX89/power supply), replace cable if necessary.	S. [→ 133], S. [→ 324]
		• Check x-ray detector, replace if necessary.	S. [→ 279]

Error code	Description	Actions required	see
E2 **89** 35	Error in iris diaphragm positioning.	• Restart the unit: 1. Switch off the unit. 2. Wait 1 minute. 3. Switch unit on. 4. Repeat procedure and check function.	
		If the error occurs repeatedly ... • Check x-ray detector, replace if necessary.	S. [→ 279]

Error code	Description	Actions required	see
E7 **89** 37	Video amplification outside tolerance.	• Check board DX89, replace if necessary.	S. [→ 127], S. [→ 303]

Error code	Description	Actions required	see
E2 **89** 38	Error in image signal during exposure.	• Check cable L13, replace if necessary.	S. [→ 133], S. [→ 324]
		• Check board DX89, replace if necessary.	S. [→ 127], S. [→ 303]
		• Check board DX1, replace if necessary.	S. [→ 127], S. [→ 303]

Error code	Description	Actions required	see
E1 **89** 39	Error during X-ray detector preparation.	• Repeat procedure	
		If the error occurs repeatedly ... • Check x-ray detector, replace if necessary.	S. [→ 279]

6 Troubleshooting

⚠ DANGER

Potentially lethal shock hazard!

It is essential to switch off the unit and wait at least 1 minute before removing a cover.

Switch OFF the X-ray unit before connecting a measuring instrument.

Perform continuity tests only on units which are switched off.

NOTICE

Risk of damage to unit

Select the correct current/voltage type and adjust the measuring range to match the expected readings.

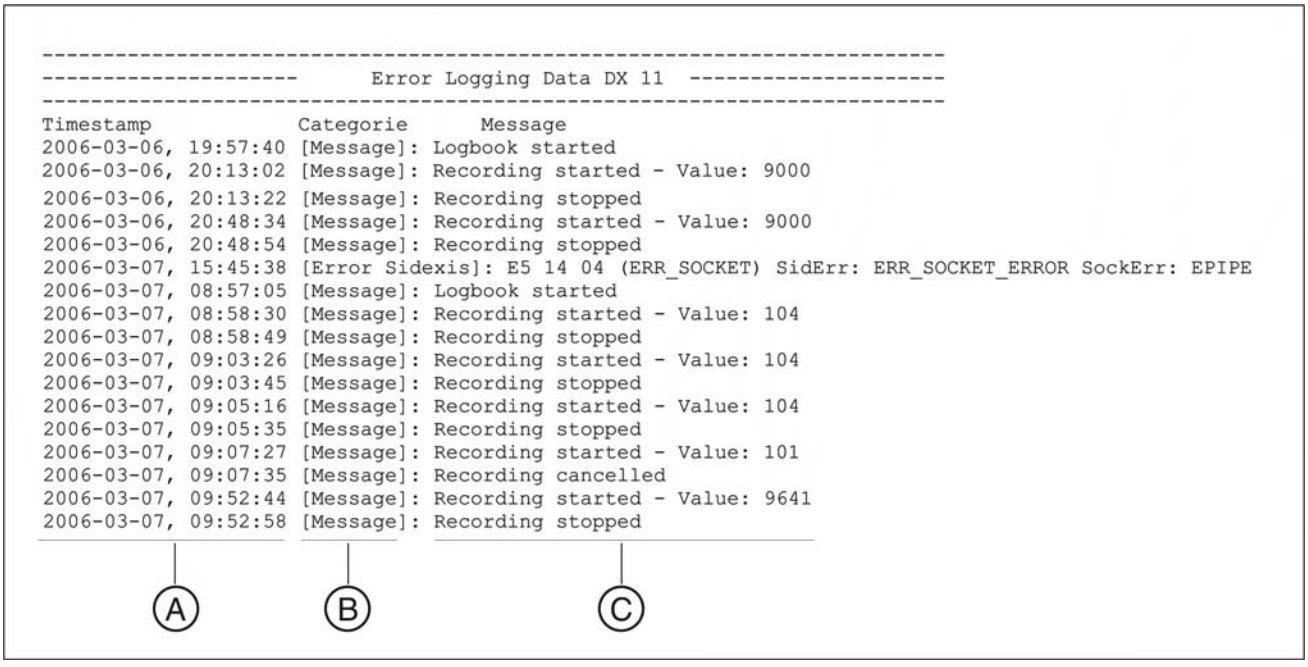
Keep to the prescribed cool-off periods if several exposures have to be taken to check a measured value.

Please observe the usual precautionary measures for handling printed circuit boards (ESD). Touch a ground point to discharge static electricity before touching any boards.

CAN bus cable: When unplugging CAN bus cables, it is essential to unplug the power supply as well.

6.1 Error logging memory

The error logging memory is part of the extended details.


Error Logging Data DX 11
Timestamp Categorie Message
2006-03-06, 19:57:40 [Message]: Logbook started
2006-03-06, 20:13:02 [Message]: Recording started - Value: 9000
2006-03-06, 20:13:22 [Message]: Recording stopped
2006-03-06, 20:48:34 [Message]: Recording started - Value: 9000
2006-03-06, 20:48:54 [Message]: Recording stopped
2006-03-07, 15:45:38 [Error Sidexis]: E5 14 04 (ERR_SOCKET) SidErr: ERR_SOCKET_ERROR SockErr: EPIPE
2006-03-07, 08:57:05 [Message]: Logbook started
2006-03-07, 08:58:30 [Message]: Recording started - Value: 104
2006-03-07, 08:58:49 [Message]: Recording stopped
2006-03-07, 09:03:26 [Message]: Recording started - Value: 104
2006-03-07, 09:03:45 [Message]: Recording stopped
2006-03-07, 09:05:16 [Message]: Recording started - Value: 104
2006-03-07, 09:05:35 [Message]: Recording stopped
2006-03-07, 09:07:27 [Message]: Recording started - Value: 101
2006-03-07, 09:07:35 [Message]: Recording cancelled
2006-03-07, 09:52:44 [Message]: Recording started - Value: 9641
2006-03-07, 09:52:58 [Message]: Recording stopped
A
B
C

Data which might be expected to occur in the error logging memory is explained below to aid you in interpreting it.

6.1.1 Example of error logging data

System time	2006-03-06, 20:13:02	System time (clock on DX11)
Entry type	[Message]	General system event
	[Message + val]	General system event with additional value
	[Error]	Error event
	[DeviceError]	Data for error event on a module
	[Error Sidexis]	Network error event
	[Stringname]	Free status texts
	[Stringsegment]	Additional data (string name)
	[RTC Date / Time Change]	Date and time of a SIDEXIS PC
	[PC Date / Time]	Date and time of the DX11 set
	[Compression table]	Compression table
Entry data [Message]	Self-test: Successful	Self-test completed successfully
	Recording started	Start of a recording
	Value: 9000	Sequence ID of the recording
	Recording stopped	End of an exposure
	Recording cancelled	Exposure cancelation
	Termination state	Reason for ending exposure
	Value: 0	Exposure completed
	Value: 1	Exposure cancelation by user
	Value: 2	Exposure cancelation due to internal error
	Imagetransfer started	Start of image data transfer
	Imagetransfer stopped	End of image data transfer
	Logbook started	Corresponds to unit switch-on
	Image state switched to Released	Exposure has been delivered to SIDEXIS XG and confirmed by SIDEXIS XG.
	Other entry data which document the occurrence of a rescue event include: • Image state switched to Rescue • Rescue request Sidexis Error • Rescue request Sidexis TrackEpilogue • Rescue request Sidexis Timeout These entry data may also occur after "Recording stopped" or "Cancel" and indicate an exceptional circumstance. You can supply important information for error diagnosis in coordination with the Sirona Customer Service Center.	
Entry data [Error]	E6 07 06	Error code
	ERR_DX7_TTP_LOST	Clear text error display

Entry data [DeviceError]	DEV_DX42	Name of module to which the message refers
	Byte 0-7: 0x10 0x00 0x00 0x00 0x00 0x00 0x00 0x00	Detailed error bytes for an error occurrence
Entry data [Error Sidexis]	SidErr: ERR_SOCKET_ERROR	Detail of network error (for Sirona only)
	SockErr:	Detail of network error (for Sirona only)
Entry data [Stringname]	Key Act	Activation transaction
	Key Ok	Activation transaction
Entry data [Stringsegment]	7YFWDUFV-E4MMRJBW	e.g. activation or confirmation code (for activation transaction)
	061-00133	e.g. counter (ID counter reading)
Entry data [RTC Date / Time Change]	Tried to change to: YYYY-MM-DD, HH:MM:SS	e.g. Tried to change to: 2006-Nov-30, 11:32:13
Entry data [PC Date / Time]	YYYY-MM-DD, HH:MM:SS	2006-Nov-30, 11:32:13

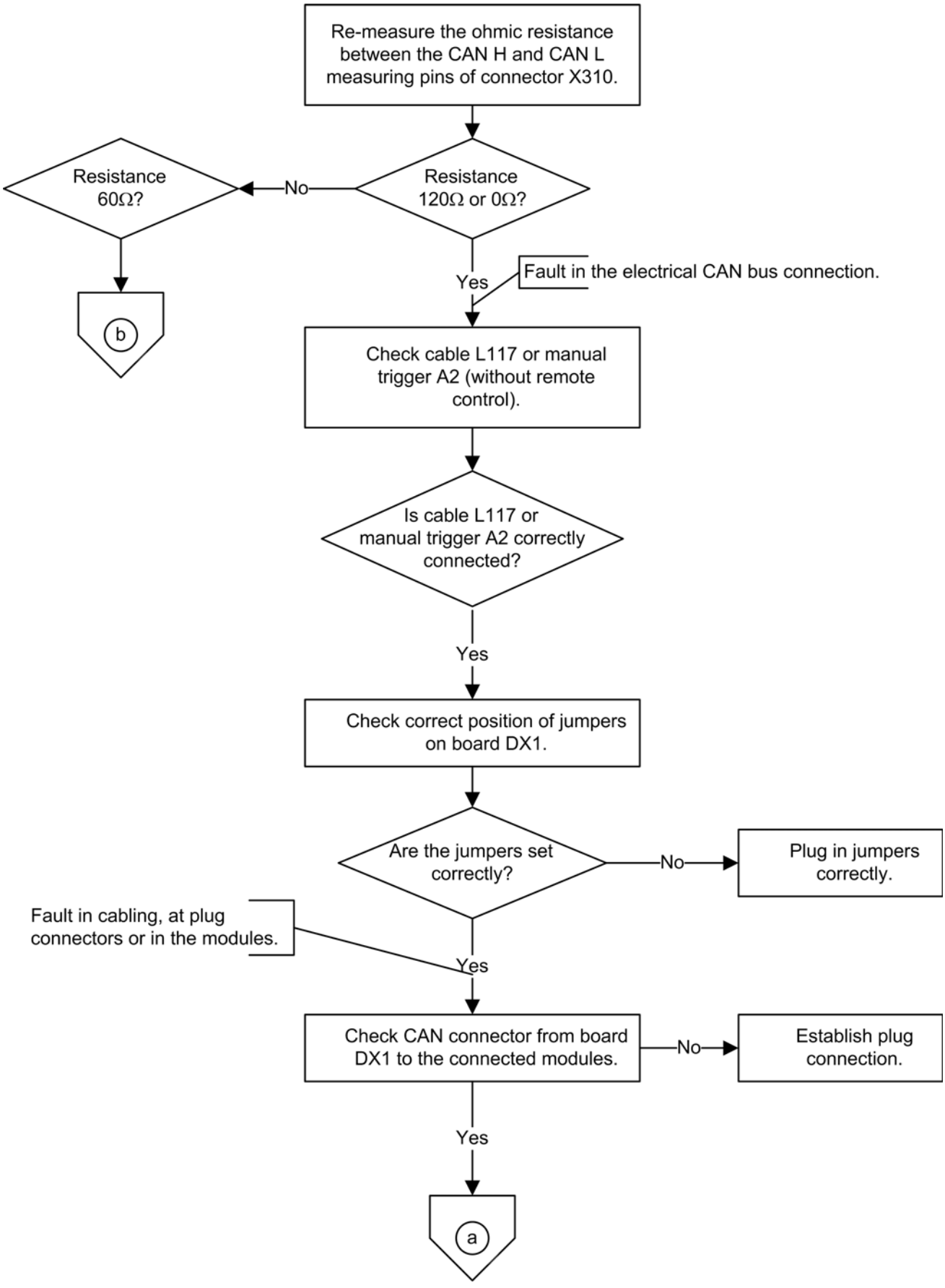
6.2 Checking the CAN bus

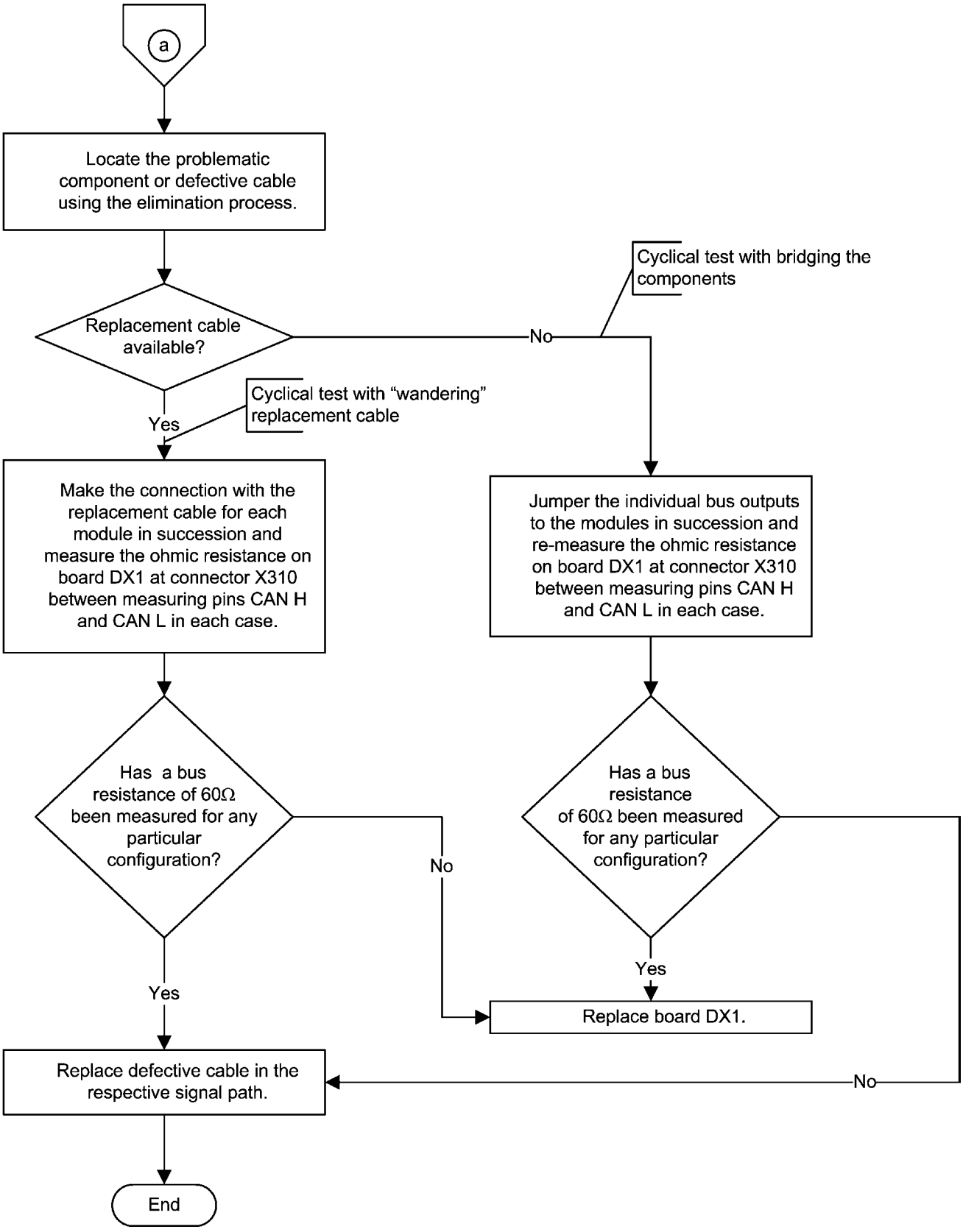
NOTICE

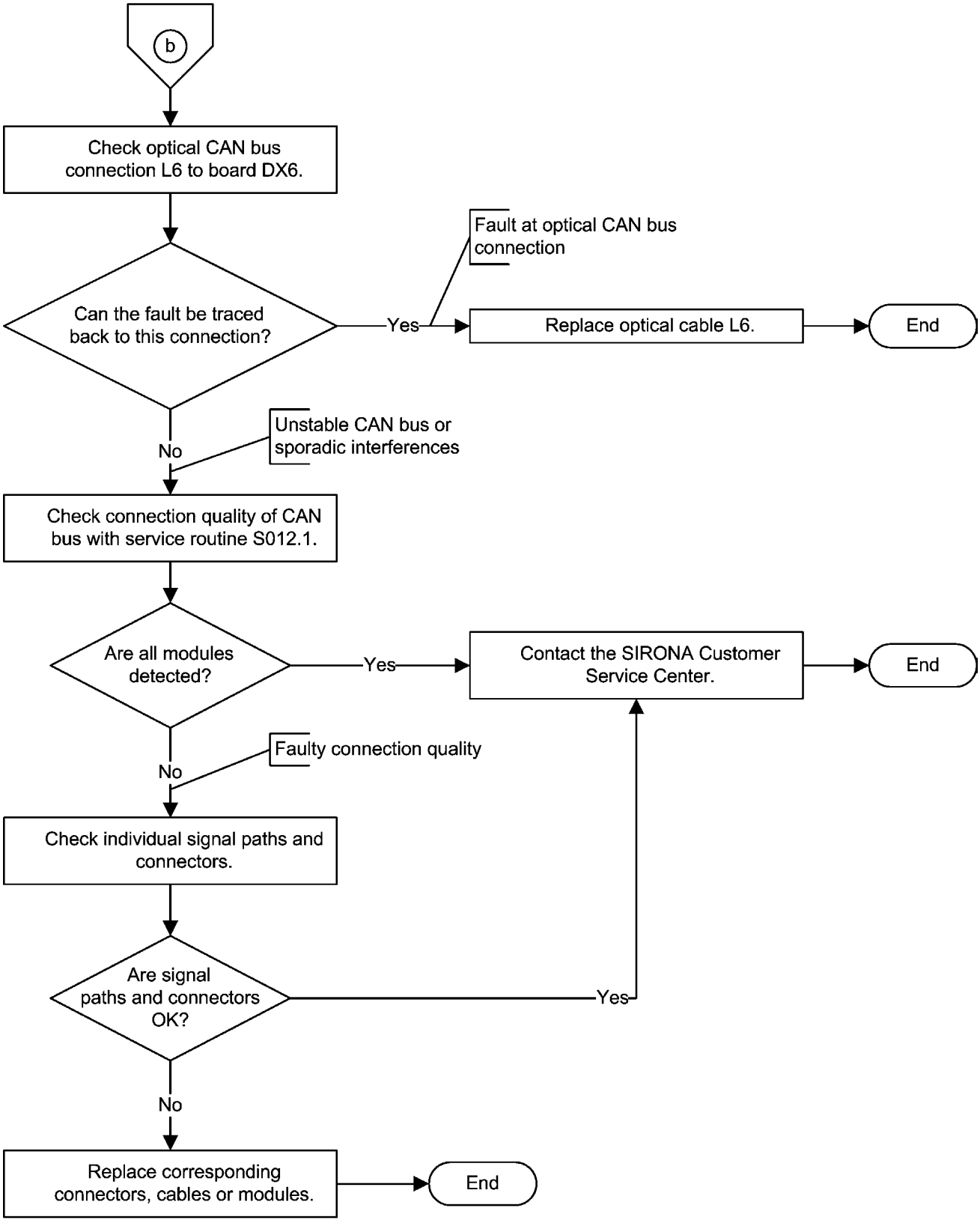
Risk of damage to unit

The power supply MUST be plugged in and switched on when cables are attached and plugged in. For example, if no power cable is connected to the DX71, the module has no ground connection to the unit and there is no potential equalization. If the CAN cable is plugged in, the CAN transceiver (IC on the DX71) can be destroyed by the voltage difference. In other words, when the unit is switched on, CAN cables may only be plugged in on modules that are connected to the power source and ground.

For troubleshooting, you can disconnect the CAN bus cable and/or plug it back in and observe the (unit's) behavior.


Re-measure the ohmic resistance between the CAN H and CAN L measuring pins of connector X310.
Resistance 120Ω or 0Ω?
No
Resistance 60Ω?
b
Yes
Fault in the electrical CAN bus connection.
Check cable L117 or manual trigger A2 (without remote control).
Is cable L117 or manual trigger A2 correctly connected?
Yes
Check correct position of jumpers on board DX1.
Are the jumpers set correctly?
No
Plug in jumpers correctly.
Fault in cabling, at plug connectors or in the modules.
Yes
Check CAN connector from board DX1 to the connected modules.
No
Establish plug connection.
Yes
a


a
Locate the problematic component or defective cable using the elimination process.
Replacement cable available?
No
Cyclical test with bridging the components
Yes
Cyclical test with “wandering” replacement cable
Make the connection with the replacement cable for each module in succession and measure the ohmic resistance on board DX1 at connector X310 between measuring pins CAN H and CAN L in each case.
Jumper the individual bus outputs to the modules in succession and re-measure the ohmic resistance on board DX1 at connector X310 between measuring pins CAN H and CAN L in each case.
Has a bus resistance of 60Ω been measured for any particular configuration?
No
Has a bus resistance of 60Ω been measured for any particular configuration?
Yes
Yes
Replace board DX1.
Replace defective cable in the respective signal path.
No
End


b
Check optical CAN bus connection L6 to board DX6.
Can the fault be traced back to this connection?
Yes
Fault at optical CAN bus connection
Replace optical cable L6.
End
No
Unstable CAN bus or sporadic interferences
Check connection quality of CAN bus with service routine S012.1.
Are all modules detected?
Yes
Contact the SIRONA Customer Service Center.
End
No
Faulty connection quality
Check individual signal paths and connectors.
Are signal paths and connectors OK?
Yes
No
Replace corresponding connectors, cables or modules.
End

6.2.1 Checking the CAN bus with the diagnostic function of board DX1

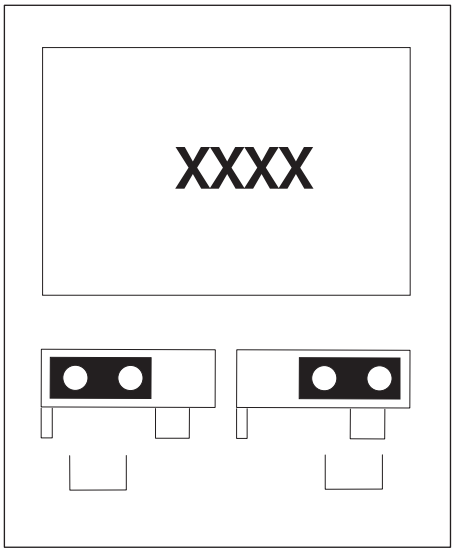
Board DX1 features a diagnostic function for diagnosing malfunctions of the CAN bus via LEDs V700 and V701 (see wiring diagrams). The following table indicates the operating status of the CAN bus and the recommended error correction measures:

V700	V701	CAN bus operation	Error correction
Slow flashing	Slow flashing	CAN bus OK	Not required
Fast flashing	Off	CAN error, no communication with board DX7, i.e. no display of error messages	• Check cabling. • Check CAN jumpers (Jumper positions in the CAN bus [→ 125])
Fast flashing	Fast flashing	CAN error, no physical communication with CAN bus possible; there is probably a short circuit in the CAN cable or on the board of a module.	• Disconnect CAN cables one after the other (set jumpers to inner position!) until the CAN bus functions again (V700 and V701 flash slowly). Replace faulty module.
Off	Fast flashing	CAN error, CAN bus TTP (time trigger protocol) disturbed by defective, constantly transmitting board (bus-heavy).	• Disconnect CAN cables one after the other (set jumpers to inner position!) until the CAN bus functions again (V700 and V701 flash slowly). Replace faulty module.
Off	Off	System did not power up (DX11)	Switch unit off and on again and wait until end of power-on time.

6.2.2 Jumper positions in the CAN bus

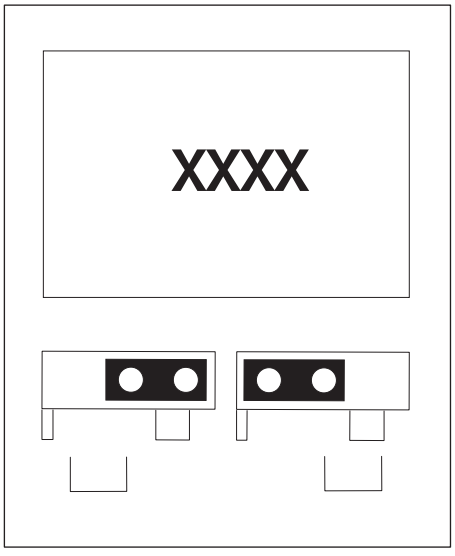
The jumpers are located on board DX1 at sockets X302, X303, X306, X307, X309, X500, and X503 (see also wiring diagrams). If a cable is connected to the socket, the corresponding jumpers must be set to the outer position. If no cable is plugged in, the jumpers must be set to the inner position. If a jumper is set to the inner position without a cable plugged in, the CAN bus is interrupted at this location. Modules located behind this location can no longer be connected to the CAN bus and, therefore, do not function.

Jumper outside



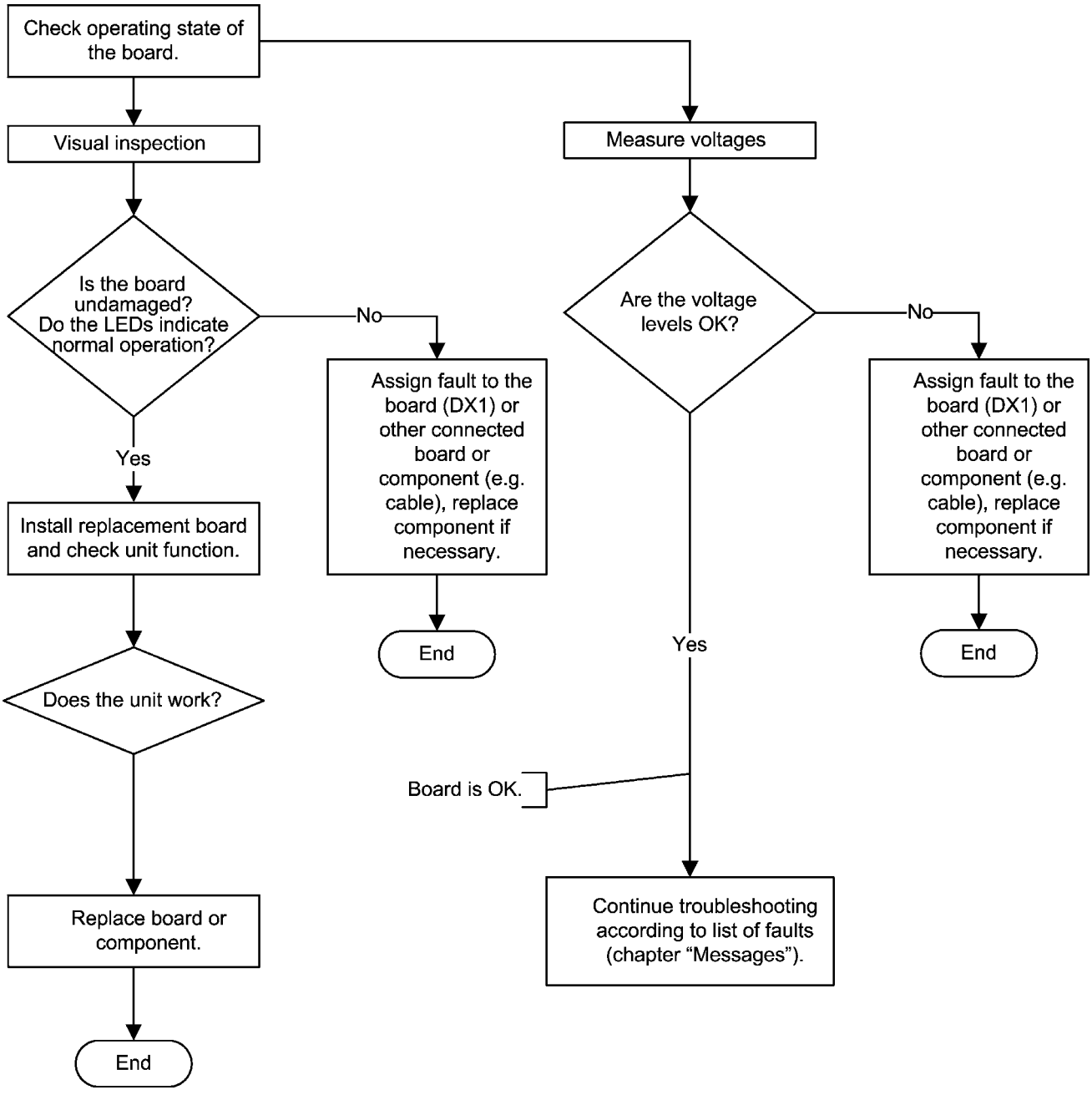
If the jumpers are set to the outer position, the module is connected (i.e. the connector is plugged in).

Jumper inside



If the jumpers are set to the inner position, the module is *not* connected (i.e. the connector is *not* plugged in).

6.3 Checking the boards

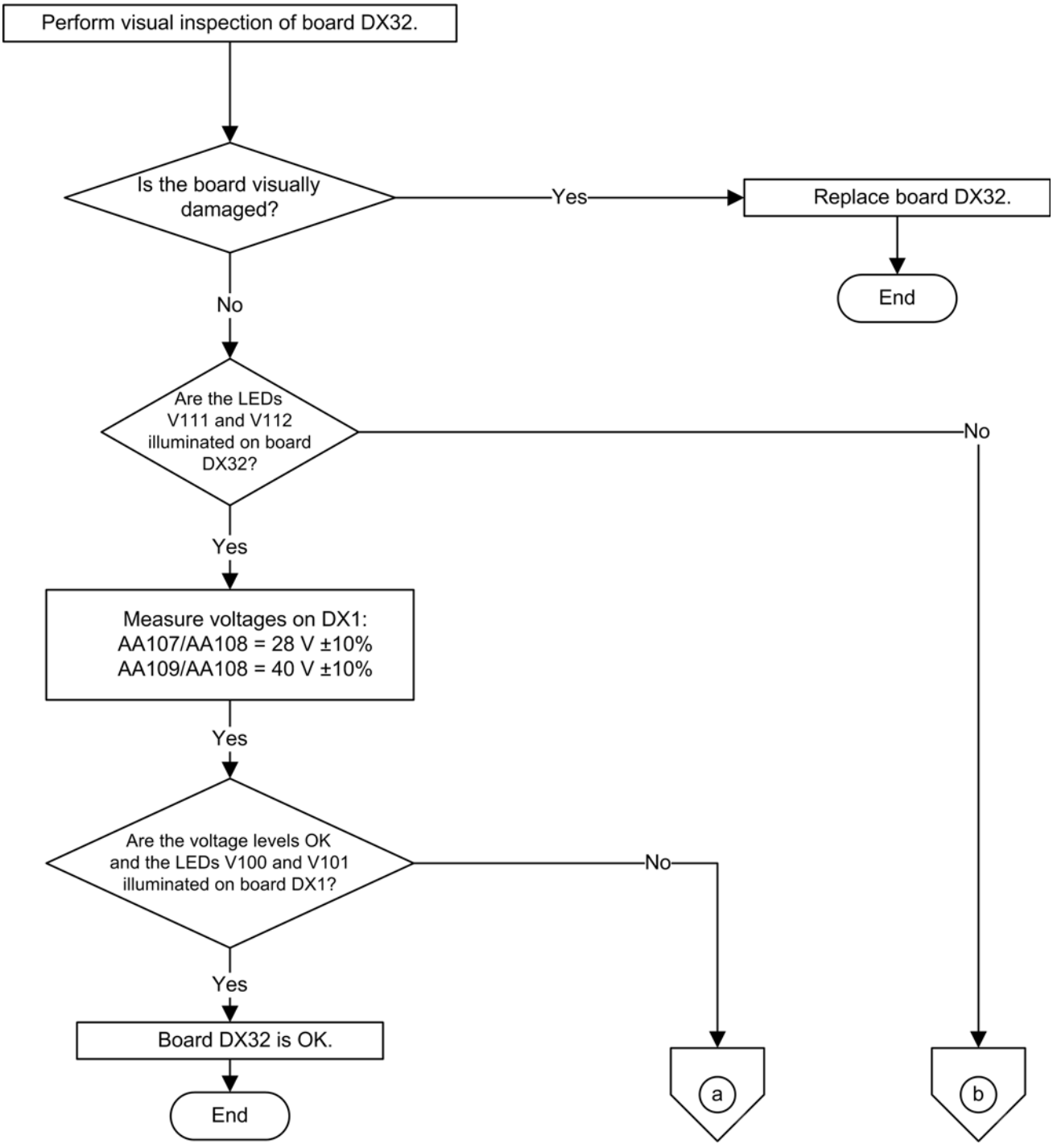

Check operating state of the board.
Visual inspection
Is the board undamaged? Do the LEDs indicate normal operation?
No
Assign fault to the board (DX1) or other connected board or component (e.g. cable), replace component if necessary.
End
Yes
Install replacement board and check unit function.
Does the unit work?
Replace board or component.
End
Measure voltages
Are the voltage levels OK?
No
Assign fault to the board (DX1) or other connected board or component (e.g. cable), replace component if necessary.
End
Yes
Board is OK.
Continue troubleshooting according to list of faults (chapter “Messages”).

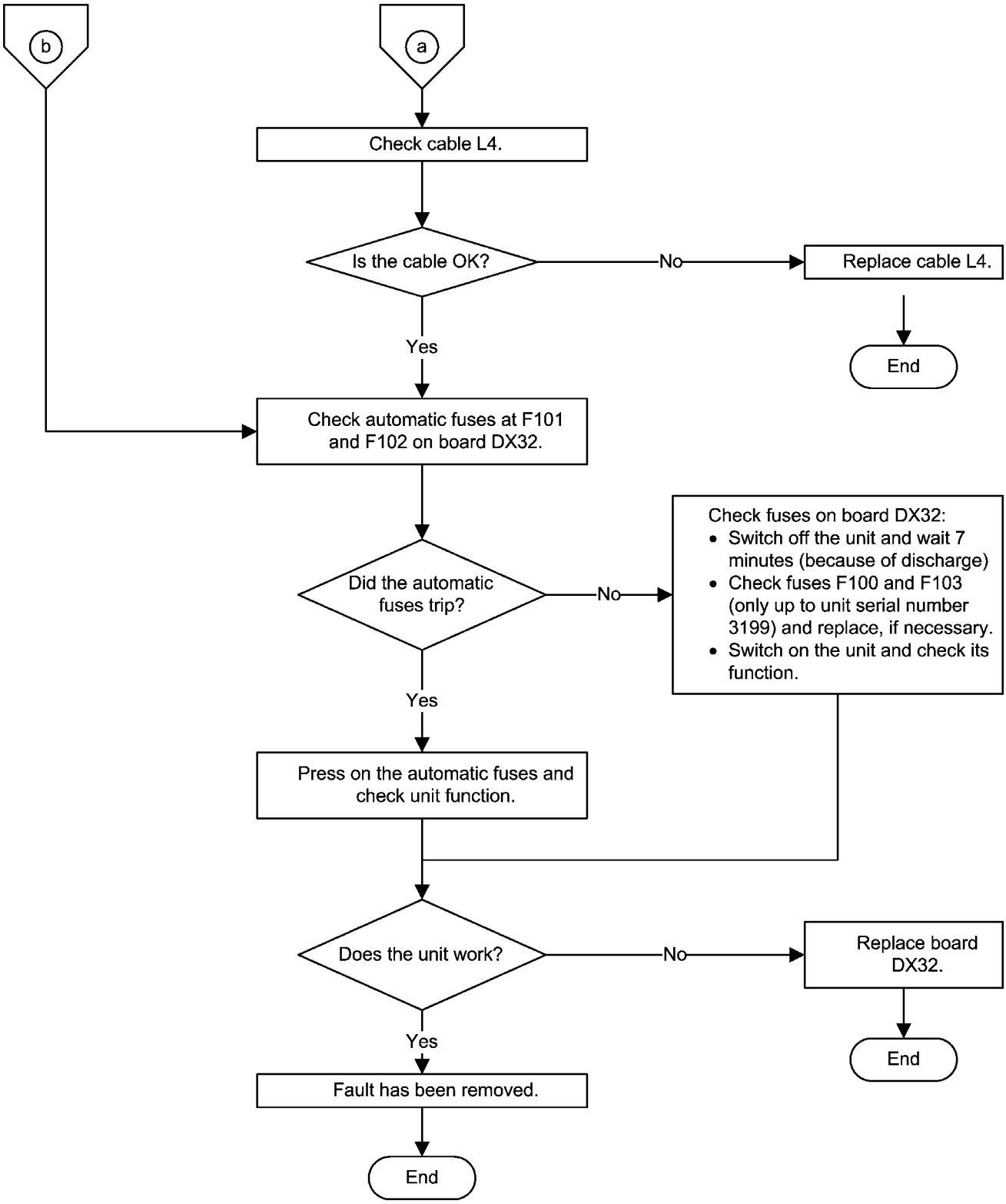
Important LEDs on the boards

(see also wiring diagrams)

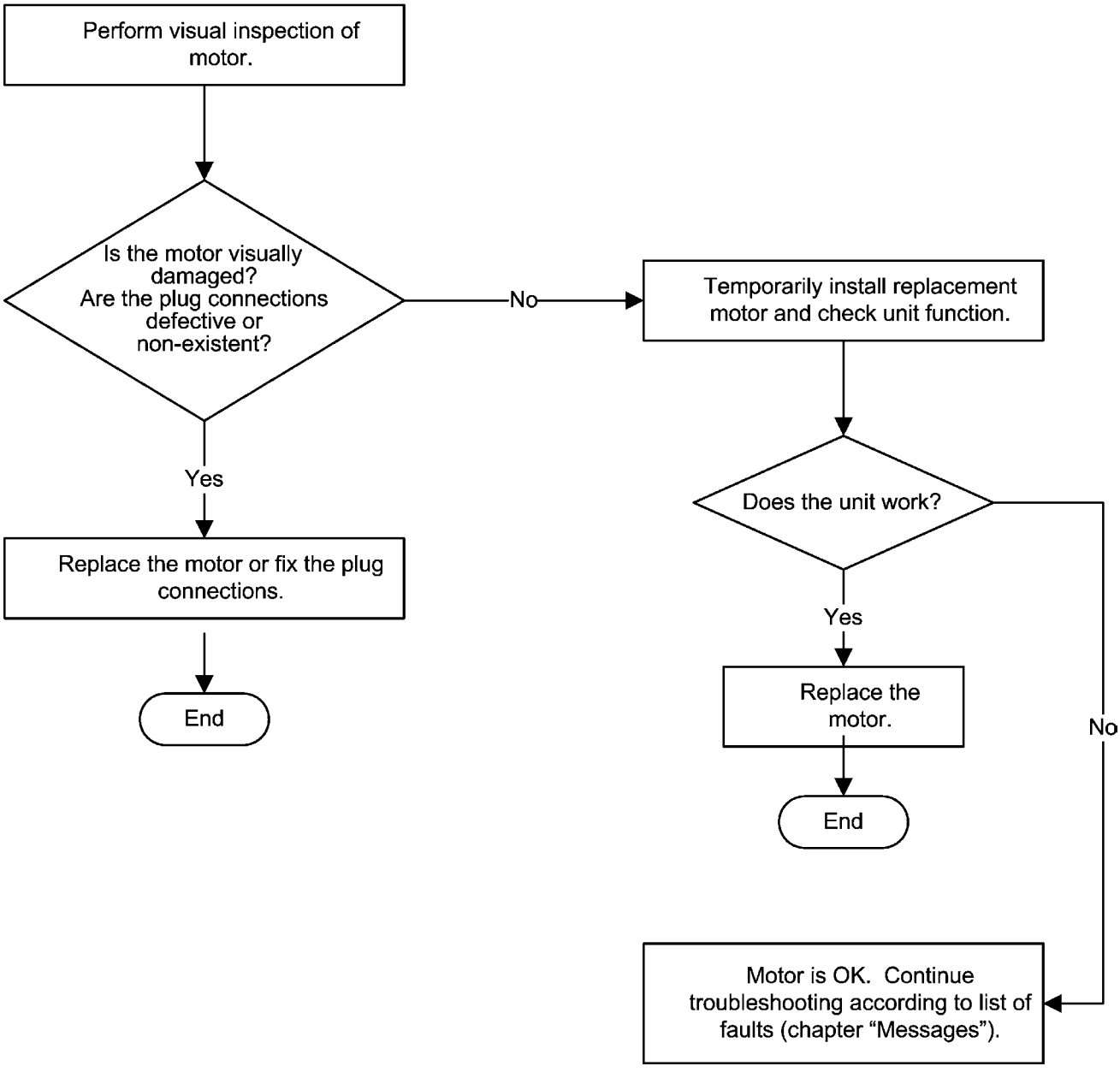
Board	LEDs	Normal operation	Malfunction	Bootloader
DX1	V100	lit	not lit	
	V101	lit	not lit	
	V108	lit	not lit	
	V110	lit	not lit	
	V200	flashing at 1 Hz	lit or not lit	
	V610	lit	not lit	flashing at 2 Hz
DX6	V200	flashing at 1 Hz	not lit	flashing at 2 Hz
	V500	lit	not lit	
DX7	V100	lit	not lit	
	V101	lit	not lit	
	V102	lit	not lit	
DX71	V101	lit	not lit	
	V103	lit	not lit	
	V107	flashing at 1 Hz	not lit	flashing at 2 Hz
DX32	V132	lit	not lit	
	V133	lit	not lit	
DX42	V101	lit	not lit	
	V103	lit	not lit	
DX89	V201	lit	not lit	
	V202	lit	not lit	
	V203	lit	not lit	
	V204	flashing at 1 Hz	not lit	flashing at 2 Hz
	V205	lit	not lit	
	V207	lit	not lit	

6.3.1 Checking board DX32

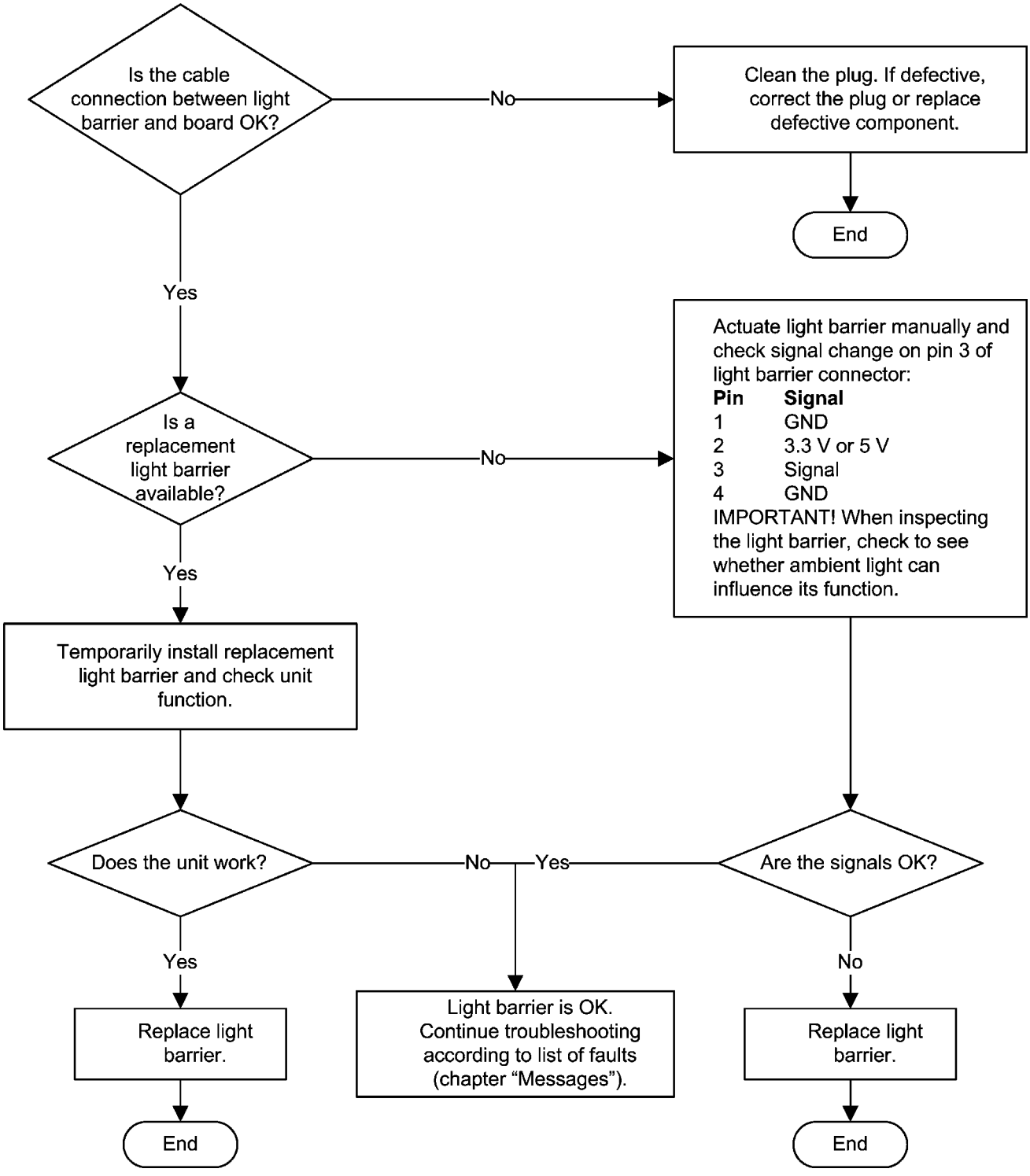



b
a
Check cable L4.
Is the cable OK?
No
Replace cable L4.
End
Yes
Check automatic fuses at F101 and F102 on board DX32.
Did the automatic fuses trip?
No
Check fuses on board DX32:
• Switch off the unit and wait 7 minutes (because of discharge)
• Check fuses F100 and F103 (only up to unit serial number 3199) and replace, if necessary.
• Switch on the unit and check its function.
Yes
Press on the automatic fuses and check unit function.
Does the unit work?
No
Replace board DX32.
End
Yes
Fault has been removed.
End

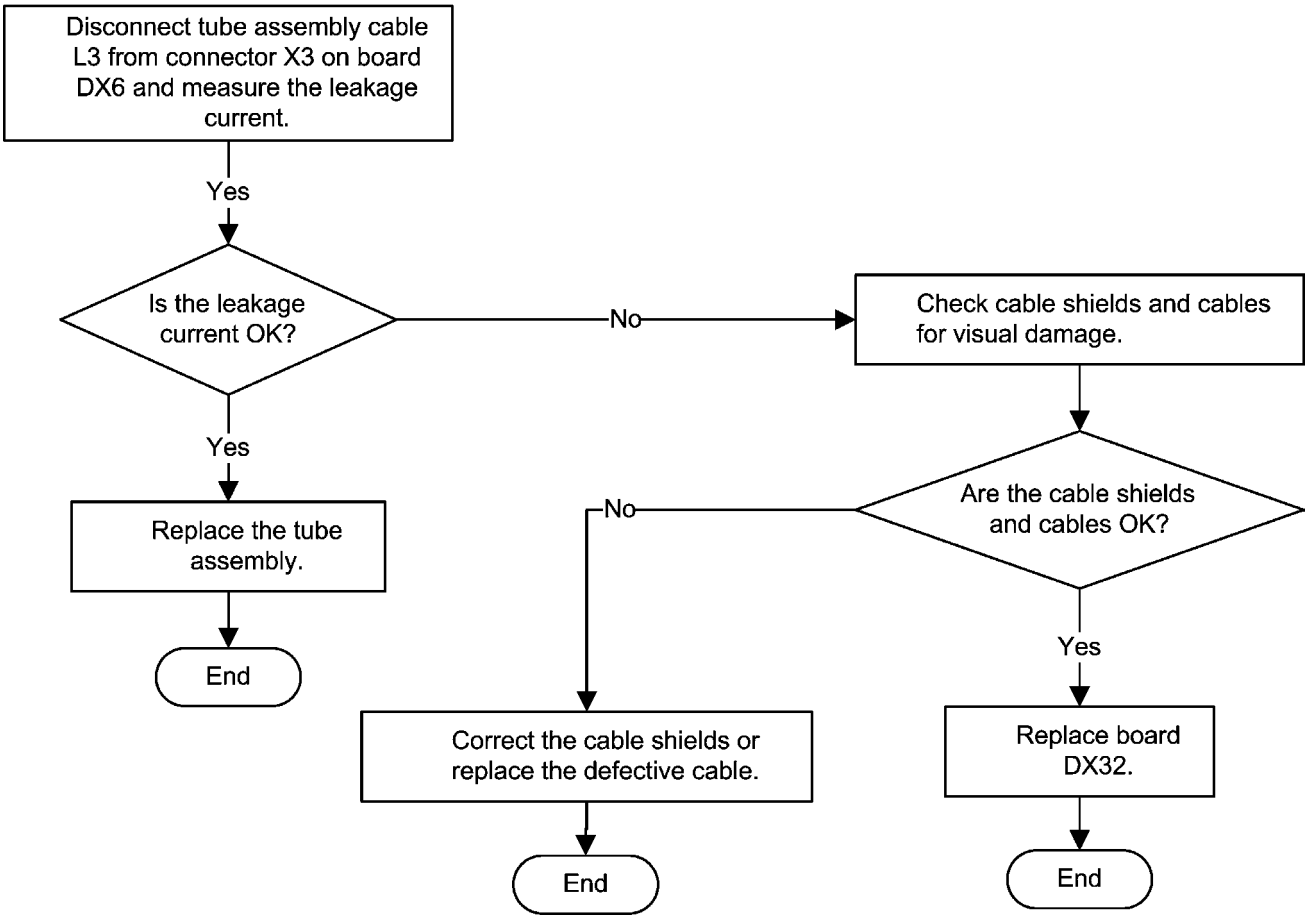
6.4 Checking the motors


Perform visual inspection of motor.
Is the motor visually damaged? Are the plug connections defective or non-existent?
No
Yes
Temporarily install replacement motor and check unit function.
Does the unit work?
Yes
No
Replace the motor or fix the plug connections.
End
Replace the motor.
End
Motor is OK. Continue troubleshooting according to list of faults (chapter “Messages”).

6.5 Checking the light barriers


Is the cable connection between light barrier and board OK?
No
Clean the plug. If defective, correct the plug or replace defective component.
End
Yes
Is a replacement light barrier available?
No
Actuate light barrier manually and check signal change on pin 3 of light barrier connector:
Pin Signal
1 GND
2 3.3 V or 5 V
3 Signal
4 GND
IMPORTANT! When inspecting the light barrier, check to see whether ambient light can influence its function.
Yes
Temporarily install replacement light barrier and check unit function.
Does the unit work?
No
Yes
Are the signals OK?
Yes
No
Replace light barrier.
Light barrier is OK. Continue troubleshooting according to list of faults (chapter “Messages”).
Replace light barrier.
End
End

6.6 Device leakage current too high

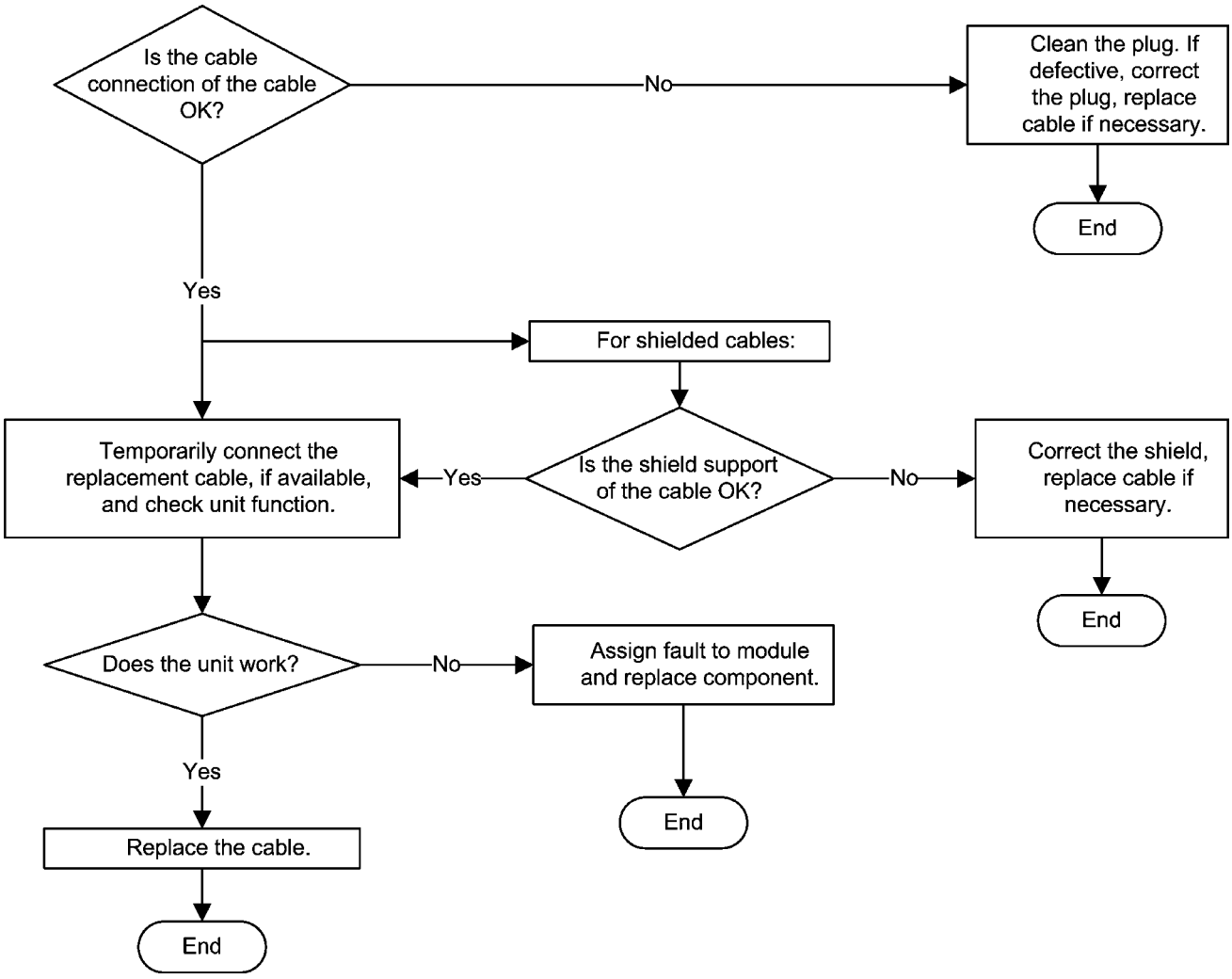

Disconnect tube assembly cable L3 from connector X3 on board DX6 and measure the leakage current.
Yes
Is the leakage current OK?
No
Check cable shields and cables for visual damage.
Yes
Replace the tube assembly.
End
No
Are the cable shields and cables OK?
Yes
Correct the cable shields or replace the defective cable.
End
Replace board DX32.
End

6.7 Checking the cables

NOTICE

You can use a standard Cat5 cable as a test cable for **L8** (up to unit serial number 3201), **L10**, **L12**, **L40** and **L37**. **This cable must not be permanently installed.**

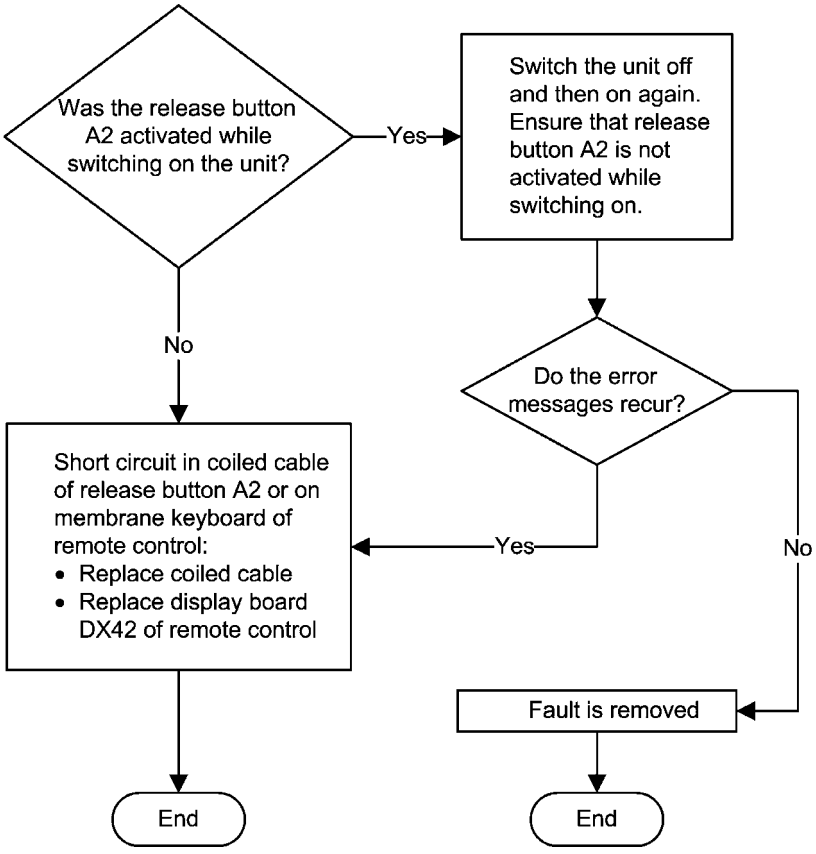
IMPORTANT: Most cables have the same plug at both ends and are connected 1:1.


Is the cable connection of the cable OK?
No
Clean the plug. If defective, correct the plug, replace cable if necessary.
End
Yes
For shielded cables:
Is the shield support of the cable OK?
Yes
No
Temporarily connect the replacement cable, if available, and check unit function.
Correct the shield, replace cable if necessary.
End
Does the unit work?
No
Assign fault to module and replace component.
End
Yes
Replace the cable.
End

6.8 Error analysis of X-RAY control signal path

Error and help messages *with remote control installed*

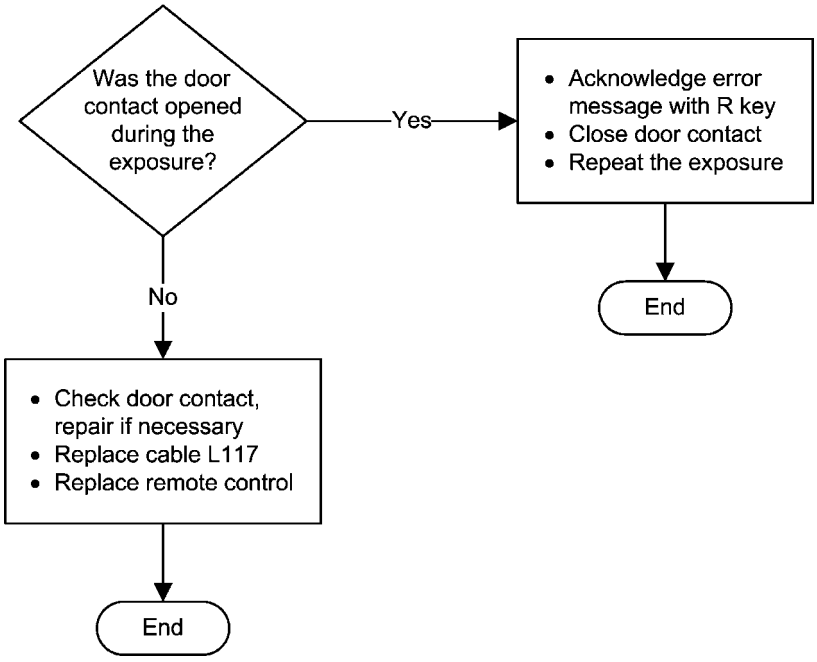
E3 42 31 + E3 13 40 occur in combination after the unit is switched on with the door contact closed:


Was the release button A2 activated while switching on the unit?
Yes
Switch the unit off and then on again. Ensure that release button A2 is not activated while switching on.
No
Do the error messages recur?
Yes
No
Short circuit in coiled cable of release button A2 or on membrane keyboard of remote control:
• Replace coiled cable
• Replace display board DX42 of remote control
Fault is removed
End
End

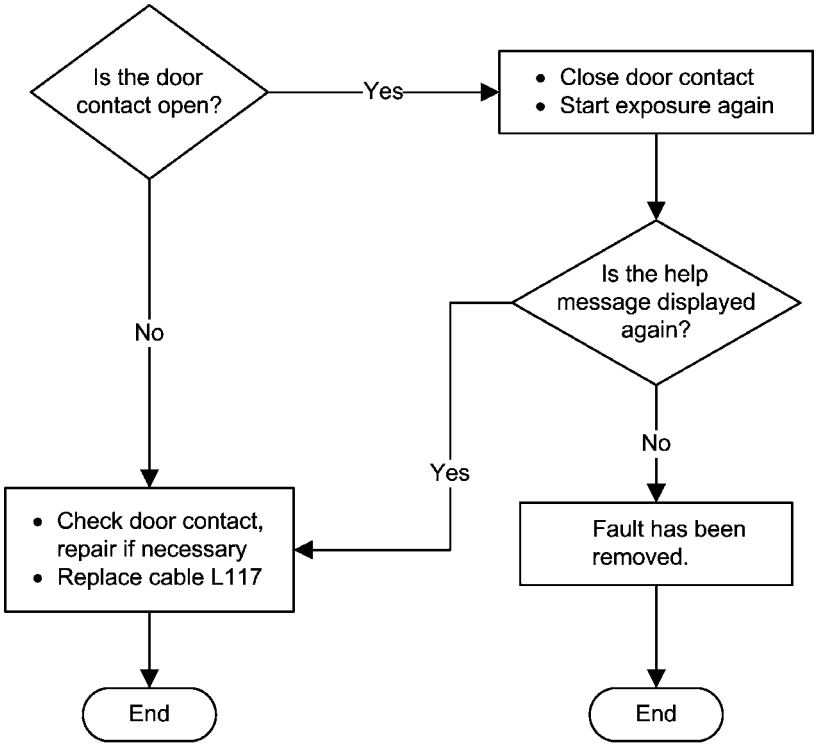
E3 42 31 occurs once after the unit is switched on:

Hardware fault on display board DX42 or short circuit in coiled cable of release button A2 or on membrane keyboard of remote control:
- Replace release button A2
- Replace remote control

E6 13 43 occurs once during operation of the unit:

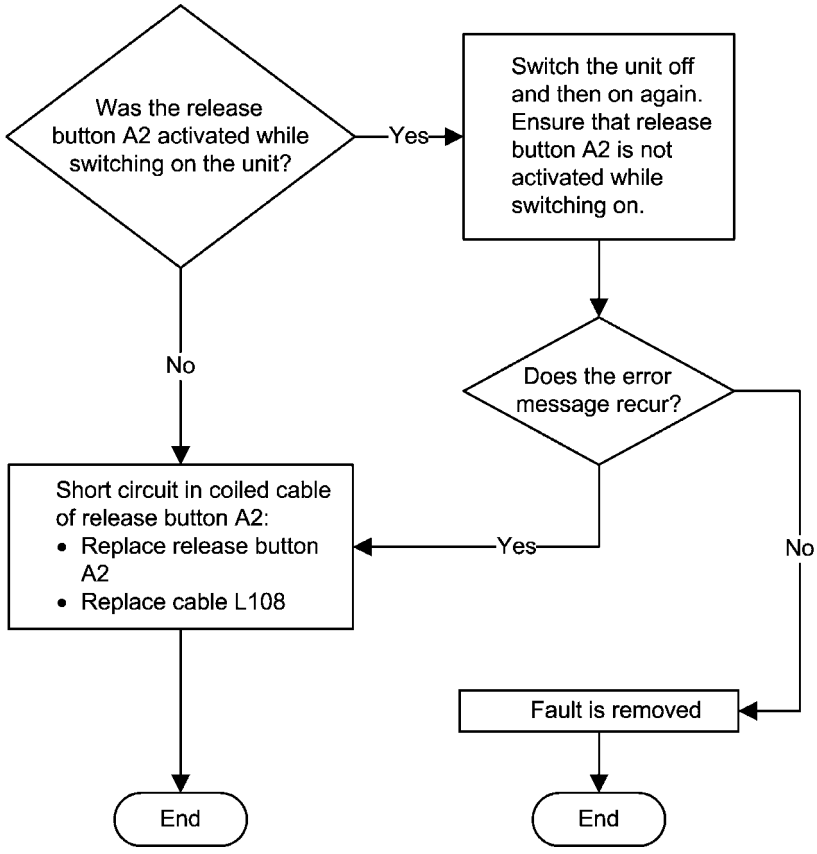


H321 is triggered at start of exposure:



Error messages *without installed remote control*

E3 13 40 occurs after the unit is switched on:


Was the release button A2 activated while switching on the unit?
Yes
Switch the unit off and then on again. Ensure that release button A2 is not activated while switching on.
No
Does the error message recur?
Yes
No
Short circuit in coiled cable of release button A2:
• Replace release button A2
• Replace cable L108
Fault is removed
End
End

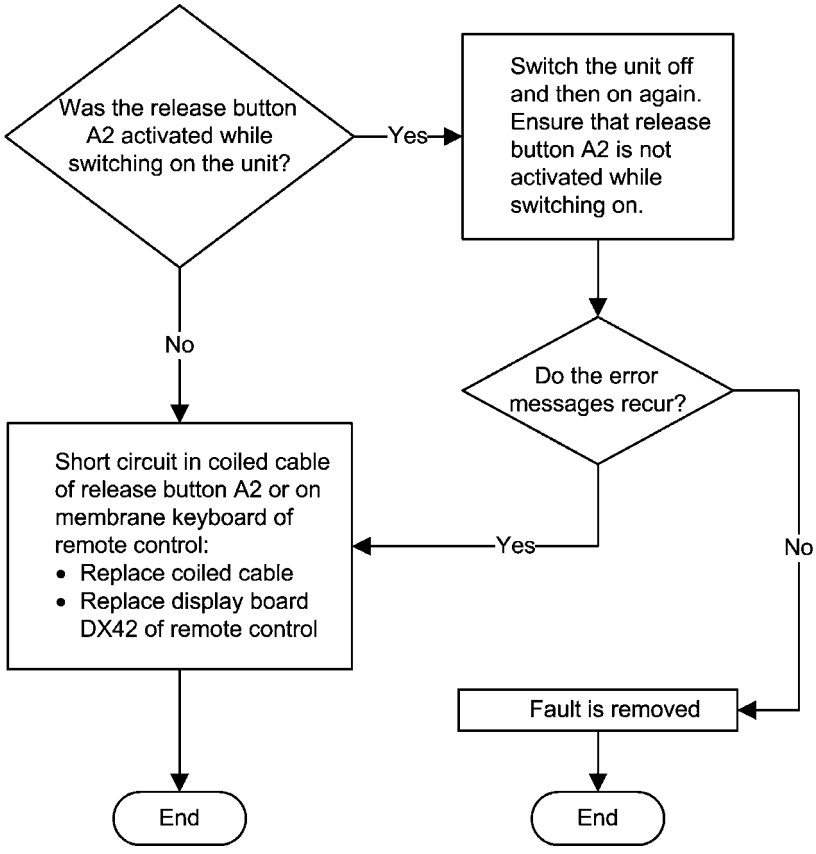
Error messages *with and without installed remote control*

Error code	Description	Actions required	see
E3 **13** 40	Short circuit in signal path between board DX11 and release button A2 during power-on.	• Replace cable L117 or L108. • Replace board DX1. • Replace board DX11.	S. [→ 324], S. [→ 303]
E6 **13** 41	Release signal missing on board DX11 at start of exposure.	• Replace cable L117 or L108. • Replace board DX1. • Replace board DX11.	S. [→ 324], S. [→ 303]
E3 **13** 42	Short circuit in signal path between board DX11 and release button A2 during operation of the unit.	• Replace cable L117 or L108. • Replace board DX1. • Replace board DX11.	S. [→ 324], S. [→ 303]

6.8.1 Error analysis of X-RAY control signal path: from unit serial number 3201 (without board DX41)

Error and help messages *with remote control installed*

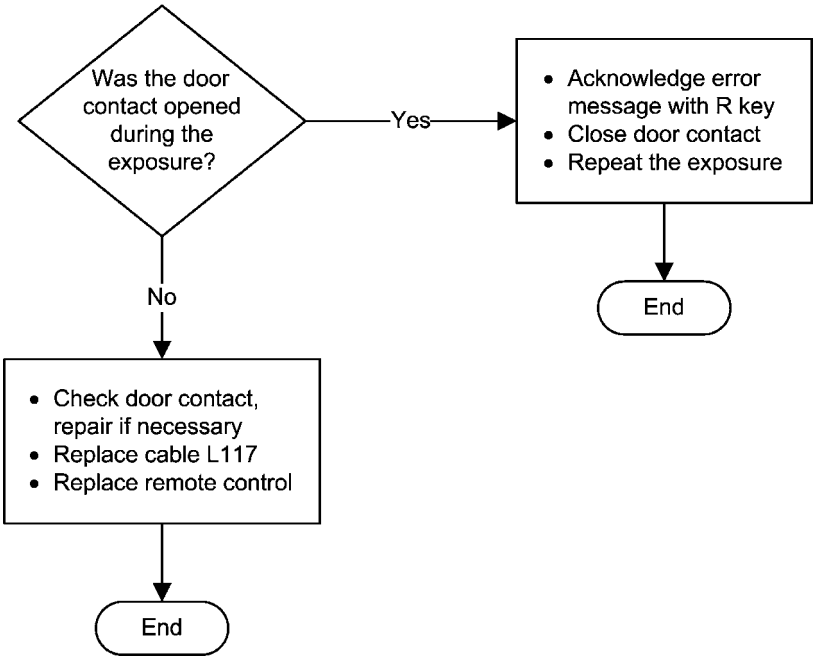
E3 42 31 + E3 13 40 occur in combination after the unit is switched on with the door contact closed:


Was the release button A2 activated while switching on the unit?
Yes
Switch the unit off and then on again. Ensure that release button A2 is not activated while switching on.
No
Do the error messages recur?
Yes
No
Short circuit in coiled cable of release button A2 or on membrane keyboard of remote control:
• Replace coiled cable
• Replace display board DX42 of remote control
Fault is removed
End
End

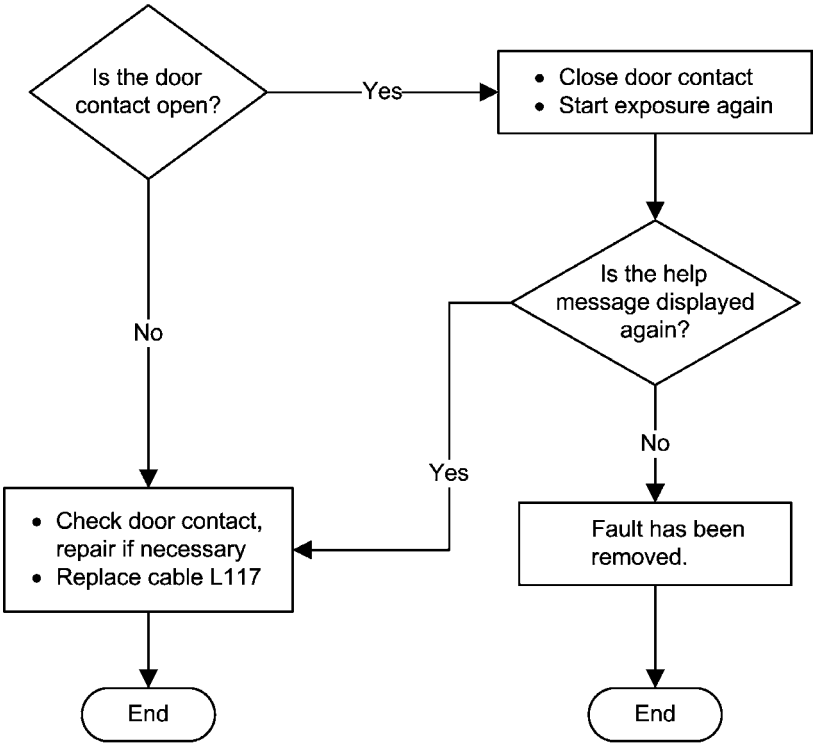
E3 42 31 occurs once after the unit is switched on:

Hardware fault on display board DX42 or short circuit in coiled cable of release button A2 or on membrane keyboard of remote control:
- Replace release button A2
- Replace remote control

E6 13 43 occurs once during operation of the unit:

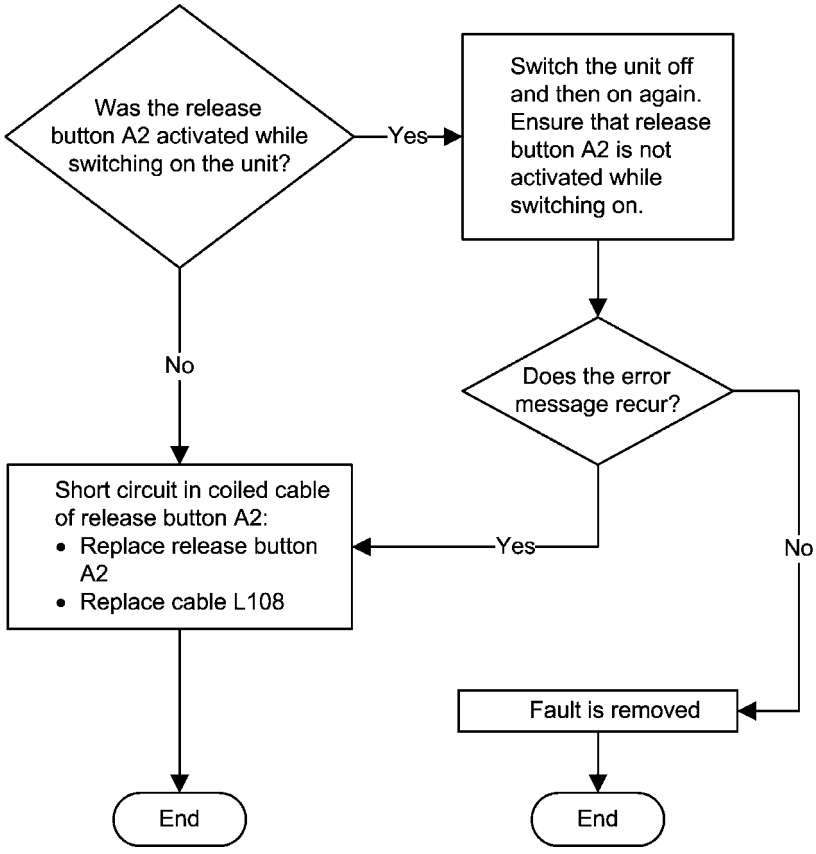


H321 is triggered at start of exposure:



Error messages *without installed remote control*

E3 13 40 occurs after the unit is switched on:


Was the release button A2 activated while switching on the unit?
Yes
Switch the unit off and then on again. Ensure that release button A2 is not activated while switching on.
No
Does the error message recur?
Yes
No
Short circuit in coiled cable of release button A2:
• Replace release button A2
• Replace cable L108
Fault is removed
End
End

Error messages *with and without installed remote control*

Error code	Description	Actions required	see
E3 **13** 40	Short circuit in signal path between board DX11 and release button A2 during power-on.	• Replace cable L117 or L108. • Replace board DX1. • Replace board DX11.	S. [→ 324], S. [→ 303]
E6 **13** 41	Release signal missing on board DX11 at start of exposure.	• Replace cable L117 or L108. • Replace board DX1. • Replace board DX11.	S. [→ 324], S. [→ 303]
E3 **13** 42	Short circuit in signal path between board DX11 and release button A2 during operation of the unit.	• Replace cable L117 or L108. • Replace board DX1. • Replace board DX11.	S. [→ 324], S. [→ 303]

6.9 Fault diagnosis of the X-ray detector and on board DX89

NOTICE

Do not damage the image tube!

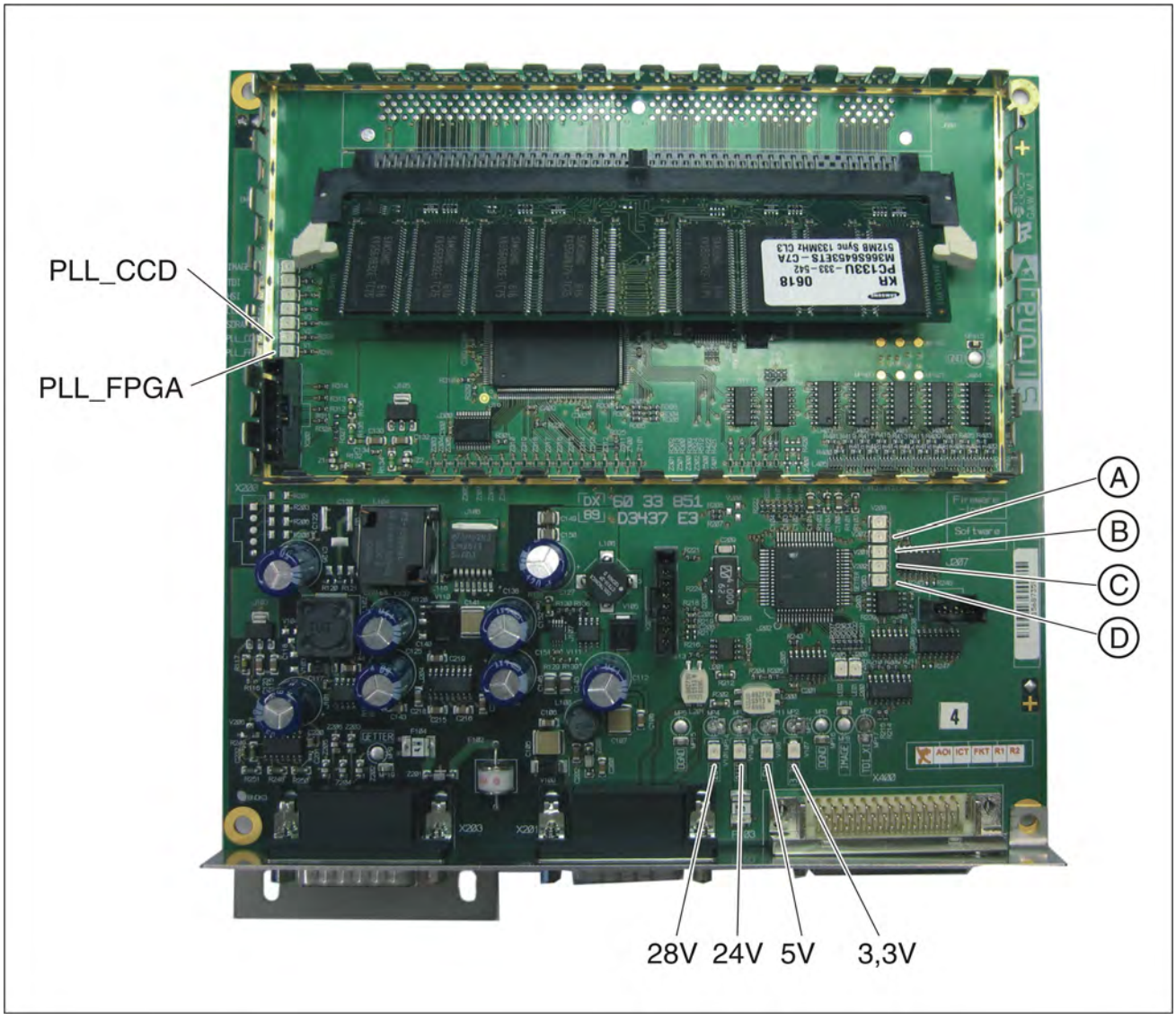
The image tube of the X-ray detector is sensitive to mechanical stress, and therefore must be handled with extreme care. Avoid bumps and jolts. Please consider this point during transport and installation.

For error messages in connection with board DX89, it is important to determine whether the fault concerned is attributable to a defect on board DX89 or to a defect in the X-ray detector. To do this, proceed as follows:

1. Move the unit down using the Up/Down keys.
2. Switch off the unit.
3. Remove the x-ray detector cover.
4. **CAUTION! Risk of injury! The cover plate has sharp edges.**
   Carefully pull the cover plate upwards to remove it from the X-ray detector (see also Replace X-ray detector [→ 279]).
5. **WARNING! Potentially lethal shock hazard! Do not touch any live parts while observing board DX89.**
   Remove the cover plate of board DX89. Switch the unit on again and observe board DX89.
   The LEDs on the board can provide information about the possible cause of the error (LEDs on board DX89 [→ 141]).

6.9.1 LEDs on board DX89

The diodes PLL_FPGA, PLL_CCD as well as (**A**) (image memory test) and (**D**) (gettering) in particular should be observed (LED statuses and their significance in case of an error [→ 142]).



A	Image memory test
B	Operating voltage on board DX89
C	Operating voltage on image amplifier
D	Gettering

6.9.2 LED statuses and their significance in case of an error

For X-ray detector errors, it is usually necessary to send the extended details of the unit to the Sirona Customer Service Center (CSC). The results of the LED inquiry described below also must be added to the extended details.

The LED statuses specified here apply to the booted system.

PLL_FPGA

LED on: FPGA on DX89 has started properly.

LED off: FPGA on DX89 has not started properly.

Action:

- Format flash file system via service routine S009.4 [→ 205].
- Run software update [→ 47].
- If this step does not lead to the desired result, board DX89 must be replaced [→ 306].

If all LEDs light up after the power-up phase, this leads to conclusions concerning a defect on board DX89. See the procedure outlined above for troubleshooting.

PLL_CCD

NOTICE

The unit must be switched off before disconnecting any plugs or cables.

LED on: There is a connection to the CCD sensor in the camera head.

LED off: There is no connection to the CCD sensor in the camera head.

Action:

- Check the plug connections and connection cables between board DX89 and the x-ray detector, if necessary, replace cable L28 or the x-ray detector.
  NOTE: In x-ray detectors with a serial number ≥5000, cable L28 cannot be replaced.

If all LEDs light up after the power-up phase, this indicates that there is a defective FPGA on board DX89. For troubleshooting, see the action under "LED OFF for PLL_FPGA".

Gettering

LED on: Gettering is o.k.

LED flashing (after a waiting period of 12 minutes): Gettering is not o.k.

Action:

- Replace the X-ray detector [→ 279].

The free ions are pumped out of the vacuum of the X-ray detector by the getters (hence the name "getter pump"). The getter current is measured during operation. If this does not drop below a certain value within 12 minutes, the gettering is not o.k. In this case, the error is probably caused by a defective x-ray detector.

Image memory test

LED on: Image memory test is o.k.

LED off: Based on the PLL_FPGA LED, check whether the FPGA on DX89 has started properly:

- PLL_FPGA LED off:
  see the action under "LED OFF for PLL_FPGA".
- PLL_FPGA LED on: Replace board DX89 [→ 306].

6.9.3 LEDs of operating voltages

NOTICE

The unit must be switched off before disconnecting any plugs or cables.

Operating voltages (28V, 24V, 5V, 3.3V)

The four LEDs are powered directly by the four operating voltages and all must light up after the system start.

If this is not the case, check connector X201 for firm seating. If the connector is OK and the LEDs still do not light up, then replace the X-ray detector [→ 279].

Supply voltage (in V)	Light-emitting diode (LED)
28	V101
24	V109
5	V108
3,3	V107

Operating voltages on DX89 and X-ray detector

These two LEDs **PLL_FPGA** and **PLL_CCD** must light up following the system start. If this is not the case, replace the x-ray detector [→ 279].

7 Adjusting and calibrating the unit

⚠ DANGER

X-rays

When performing the following tests, be sure to observe the radiation protection regulations applicable in your country (see Operating Instructions).

⚠ DANGER

X-rays

"Radiation" is signaled by the message "X-RAY active!", a beep, and an X-RAY LED.

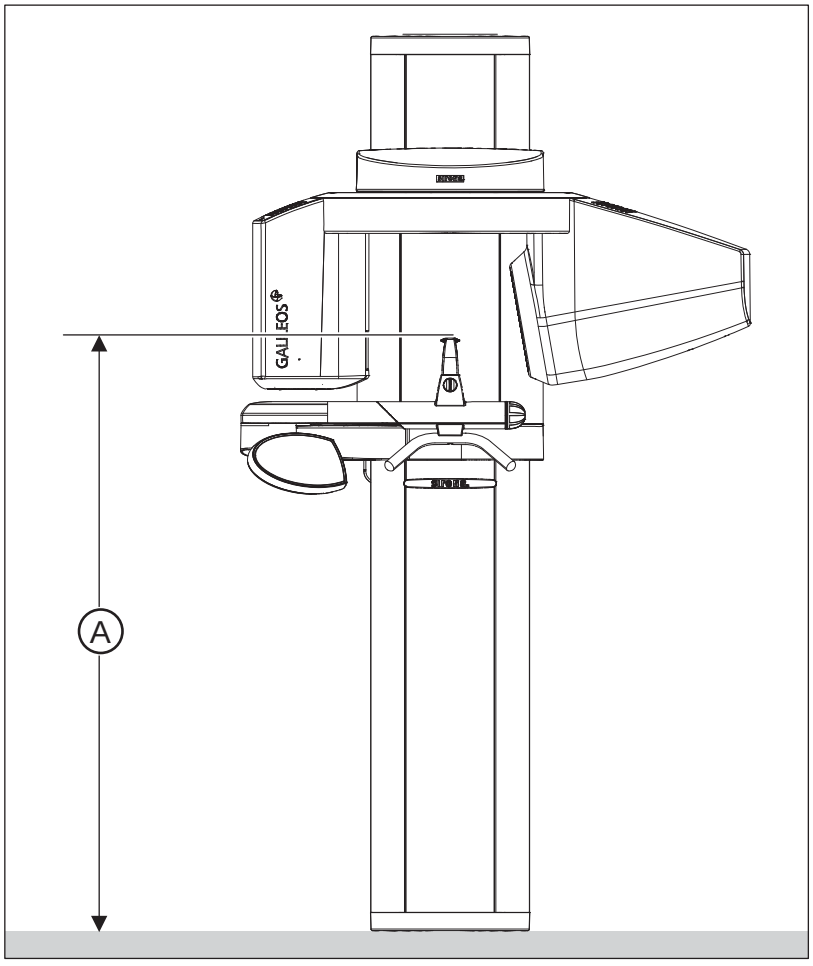
You will need the following accessories to perform unit calibration:

- Geometry phantom [→ 152]
- Distortion phantom [→ 152]
- Steel tape measure, 300mm

IMPORTANT

If you encounter problems with unit calibration, check whether the required EMC conditions have been met. No other heavy-duty electric equipment (e.g. air conditioning systems, fan motors, etc.) should be present in the vicinity of the unit.

Tip: Move the unit to a typical working height (bite block height (**A**) = approx. 1,520 mm (60")) with the Up/Down keys on the control panel before commencing calibration.



You can even adjust the height of the unit during the calibration procedure. If the unit is ready for an exposure (after the *"Image acquisition"* button has been pressed in the SIDEXIS XG service menu), the corresponding service routine (S002.6/S010.10-14/S011.8, and S030.5) is displayed on the control panel. All of these service routines allow the height adjustment menu to be opened by pressing the Test key. The current unit height is displayed in selection field 1 in this menu. You can then set the unit to the desired height using the UP/DOWN keys on the control panel.
Press the Service key or the double arrow key (Easypad) or the arrow key above selection field 3 (Multipad) to exit the height adjustment menu.

7.1 General information about unit adjustment and calibration

Start by checking the mechanical unit adjustment. This step is a prerequisite for the subsequent adjustment and calibration of the unit.

Please adhere to the following order when adjusting and calibrating the system:

- Diaphragm
- Radiation field

- Dose measurement
- Sensor
- Iris
- Shading
- Distortion
- Geometry

Tip: It may be helpful to use the SIDEXIS XG coloring function to evaluate the image.

7.1.1 Displays and help messages during adjustment/ calibration

The most frequent help and status messages during calibration are listed below.

Help messages

H3 01: Move unit to starting position, press the R key.

H3 21: Close the door.

H3 23: Close swivel arm.

H3 24: Gettering in progress, please wait.

H4 03:SIDEXIS XG is not ready for exposure, make unit ready for exposure.

Status messages

Easypad	Multipad
"Ready for exposure"	no special display; kV level and mAs are displayed
"Exposure not possible"	S110
"Please wait"	Progress bar
"Ready for exposure in XXs"	XXs
"X RAY Active!"	LED lights up on control panel

If error message E1 11 20 is displayed on the control panel and/or the remote control during the calibration process, this does not necessarily indicate an equipment error. This error message only indicates that the adjustment or calibration data of the unit is incomplete at this point. Acknowledge the error message with the R key, if applicable, and continue the adjustment or calibration procedure.
For assistance with other help messages or error messages displayed during the adjustment or calibration process, please refer to the section of these instructions entitled Messages [→ 77].

7.1.2 "Adjustment/Calibration" menu

The menu guides you through the procedure to adjust and calibrate the unit.

7.1.2.1 Calling the "Adjustment/Calibration" menu

You can call the *"Adjustment/calibration"* menu via SIDEXIS XG:

"Utilities" | *"Constancy test..."* | *"3D"* | *"Select X-ray device"* | *"Service exposure "* | *"Select X-ray component"* | *"Adjustment/calibration"* | Password prompt (see section entitled "Password protection")

The *"Select X-ray device"* and *"Select X-ray component"* prompts are only displayed if more than one unit has been set up in SIDEXIS XG.

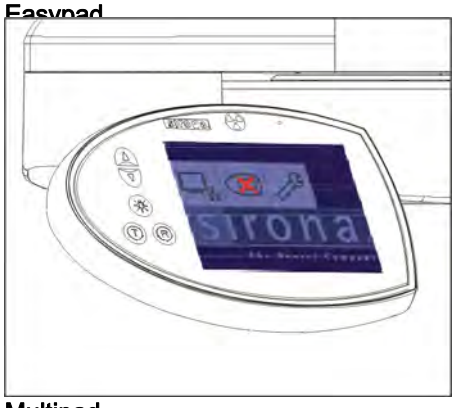
Password protection

The *"Adjustment/calibration"* menu is password-protected. For the password, enter the first four digits of the current system date (PC) in reverse order. Example: On 05/30/2010, the service password is 5003.

Service mode

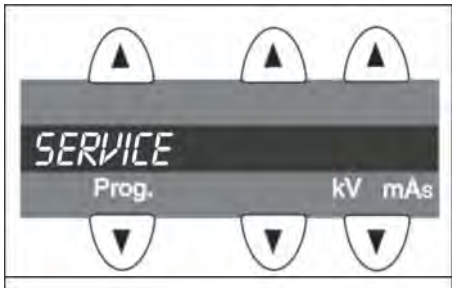
When you open the *"Adjustment/calibration"* menu, the unit switches from user mode to the PC service mode logged by the PC. In PC service mode, the control options that are available on the control panel are determined by SIDEXIS XG and the service routine currently selected. General control of the unit by means of the control panel (as in the user mode) is not possible in this mode.

Easypad

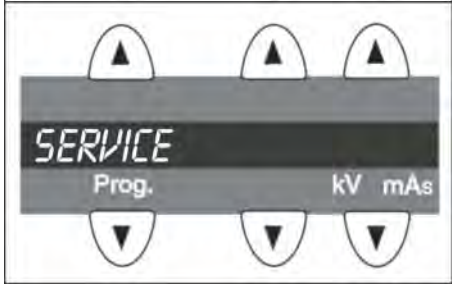


Service mode is displayed on the Easypad via the PC service image.

Multipad



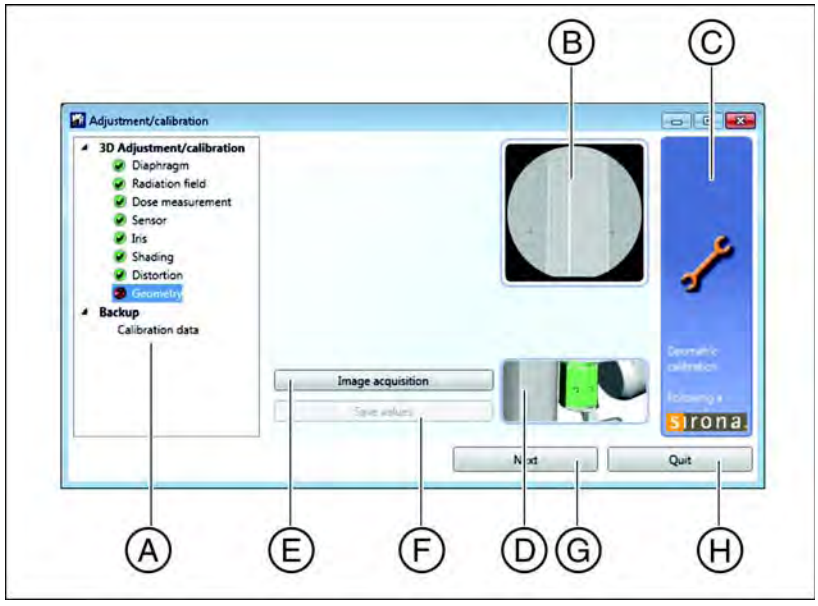
"SERVICE" is displayed on the Multipad to indicate that the service mode is active.



"SERVICE" is displayed on the Multipad to indicate that the service mode is active.

7.1.2.2 Menu structure

The menu is divided into four areas.



A	Navigation area	Structure tree for adjustment and calibration [→ 149]
B	Preview image	Shows the exposure to be taken in this stage of the adjustment/calibration procedure.
C	Message window	Shows messages and information about this stage of the adjustment/ calibration procedure.
D	Tools pictograph	Shows which (if any) test phantom must be used for this stage of the adjustment/ calibration procedure.

In addition to the four areas, the menu also contains the following buttons:

E	Image acquisition	Makes the unit ready for exposure [→ 151].
F	Save values	Saves the current adjustment/ calibration values.
G	Next	Switches to the next stage of the adjustment/calibration procedure.
H	Exit	Exits adjustment/calibration and closes the menu.

7.1.2.2.1 Navigation area

The navigation area contains a structure tree similar to the one you will be familiar with from your Windows interface. The structure tree contains all stages of the adjustment and calibration procedure you need to complete in order to adjust and calibrate your system. The order in which

the elements appear in the structure tree determines the chronological order of the procedure to adjust and calibrate the unit:

- Diaphragm
- Radiation field
- Dose measurement
- Sensor
- Iris
- Shading
- Distortion
- Geometry

In addition to the elements required for adjustment and calibration of the unit described above, the structure tree also contains one other element:

Backup

- Calibration data

Validity of existing adjustment/calibration settings

The elements of the structure tree used for adjusting (calibrating) the device are prefixed by symbols indicating the current status of the corresponding adjustment or calibration operation.

The element for saving calibration data does not contain any symbols.

Green and checked	Valid data record; adjustment/calibration is in progress	No adjustment/calibration required
Yellow	Data record available, but not yet saved	Data record must be saved
Red	Invalid data record or no record present	Adjustment/calibration required

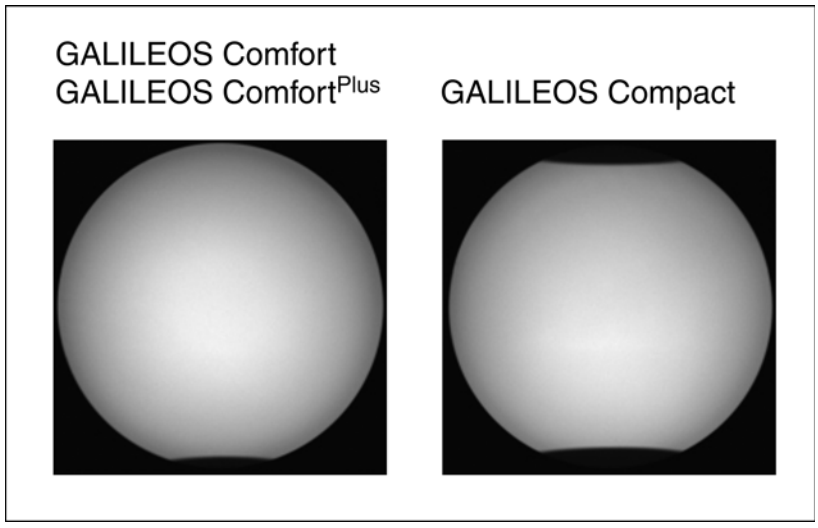
Working with the structure tree

You can navigate between the elements of the structure tree by clicking on them with the mouse.
NOTICE! You must follow the prescribed sequence in order to obtain a valid adjustment or calibration.

Click with the mouse on the small triangles in front of the elements to collapse and expand the structure tree.

7.1.2.2.2 Preview image

The *"Diaphragm"* and *"Shading"* submenus each contain a preview image that symbolizes the exposure to be taken during the calibration step. Due to the varying geometry of the "GALILEOS Comfort / Comfort Plus" and the "GALILEOS Compact" diaphragms, the preview images displayed in these submenus differ slightly.



We use only the display of the "GALILEOS Comfort" and "GALILEOS Comfort Plus" in these instructions, unless explicit reference is made to the "GALILEOS Compact".

7.1.2.2.3 Tool pictographs

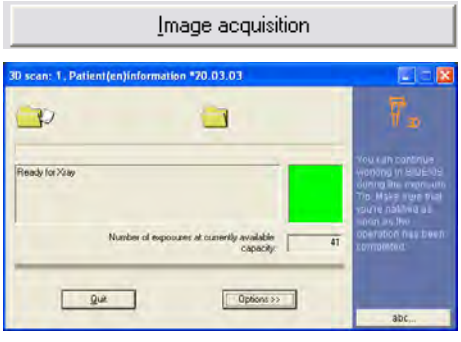
The tools pictograph shows which (if any) test phantom must be used for this particular calibration step.

Click *"Cancel"* to quit the *"Service functions"* menu.

7.1.3 Enabling exposure readiness

To take an exposure in SIDEXIS XG, the system must first be made ready for exposure.

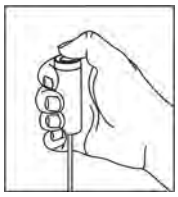
✓ Call the *"Adjustment/calibration"* menu.
✓ Select the corresponding element in the structure tree.
➢ Click on the *"Image acquisition"* button.



↳ The exposure window opens in SIDEXIS XG. It indicates the current status of exposure readiness.
↳ The service routine used for the corresponding exposure is displayed on the control panel, along with the specific exposure parameters.

7.1.4 Taking an exposure

✓ Call the *"Adjustment/calibration"* menu.
✓ Select the corresponding element in the structure tree.
✓ SIDEXIS XG must be ready for exposure.



➢ Press the release button. Press and hold down the button until the exposure is complete, the preview image is displayed in the exposure window, and the acoustic signal that indicates the end of the exposure (double beep) sounds (if it has been configured).

7.1.5 Save values

✓ The adjustment or calibration must be correct.

➢ To save the adjustment or calibration values, click the *"Save values"* button.

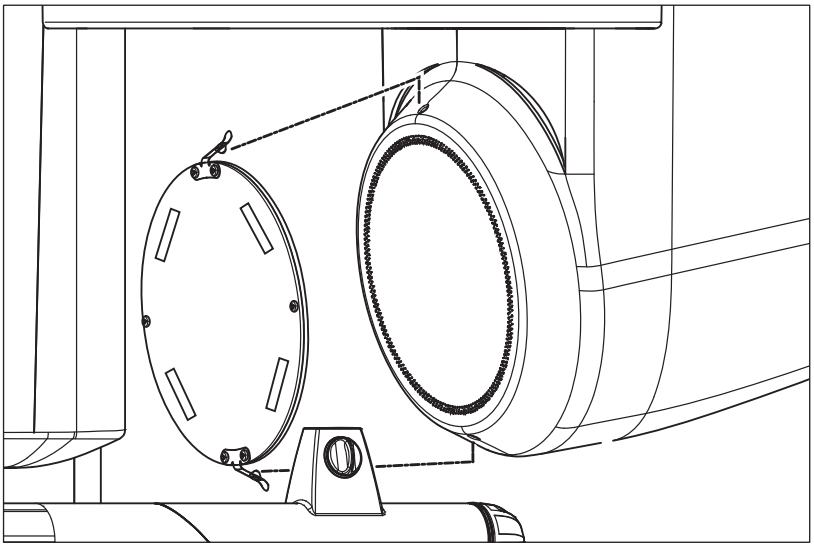
↳ The adjustment or calibration is saved.

↳ The saved adjustment or calibration is identified in the structure tree by a check mark or a green traffic light.

7.1.6 Test phantoms for adjustment and calibration

7.1.6.1 Distortion phantom

IMPORTANT
With GALILEOS Comfort^{PLUS}: With GALILEOS Comfort^{Plus}, the distortion phantom delivered with the device must be used. Distortion phantoms with a serial number <3001 may not be used for the calibration of GALILEOS Comfort^{PLUS}.



You must clip the distortion phantom onto the X-ray detector cover for the radiation field check and for the distortion calibration.

This phantom must be removed again for all other calibration steps.

7.1.6.2 Geometry phantom

IMPORTANT: Make sure that the phantom is securely fastened and in an upright position in the bite block holder of the unit.

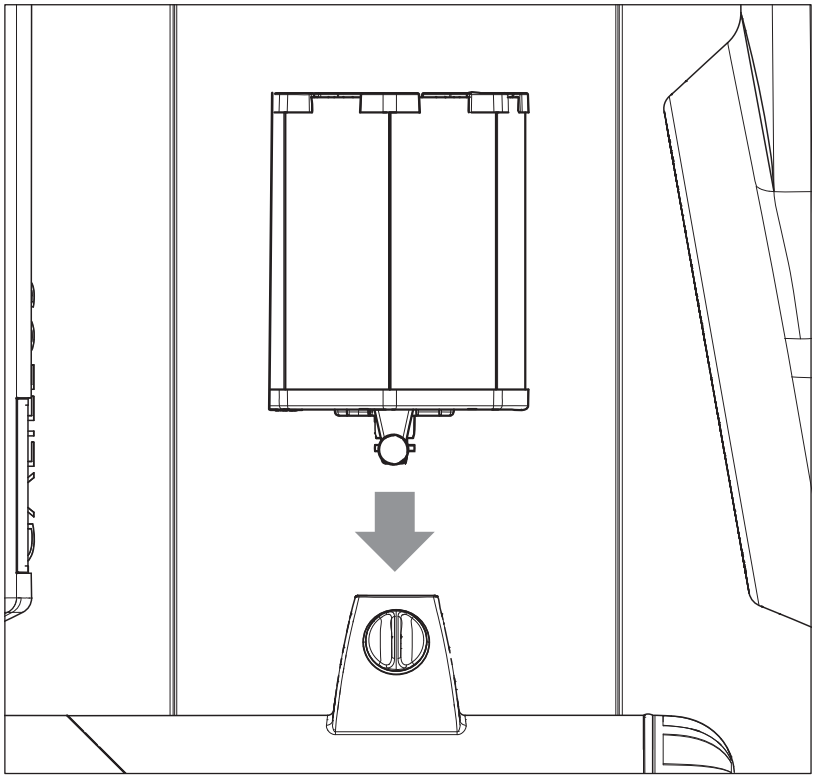
For the geometry calibration, you must insert the geometry phantom in the block holder of the unit.

This phantom must be removed again for all other calibration steps.

IMPORTANT

Note the serial number of the calibration phantom

A geometry phantom with a serial number > 3000 must be used to calibrate the GALILEOS Comfort^{PLUS}.

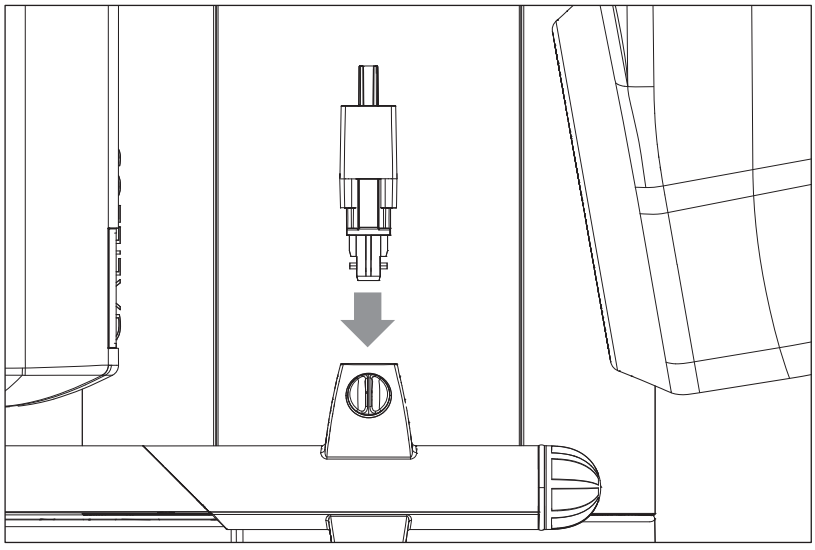


IMPORTANT

Once it has been inserted into the bite block holder, the geometry phantom must be aligned vertically and horizontally with the spirit level, so that calibration can be performed correctly.

➢ Insert the geometry phantom (**A**) into the pan bite block holder (**B**) on the unit and secure it with the screw (**C**).

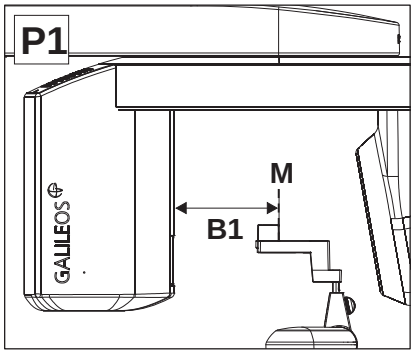
7.1.6.3 Constancy test phantom

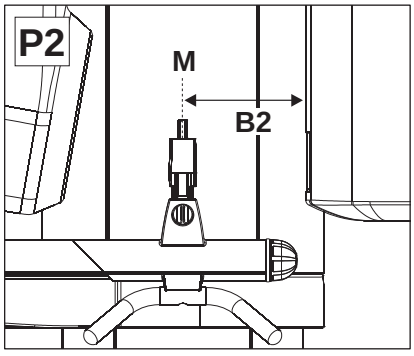


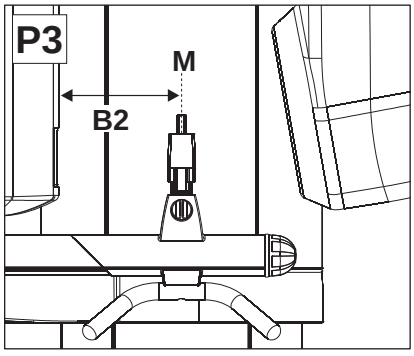
The constancy test phantom is inserted in the bite block holder of the unit for for the constancy and acceptance tests as well as for the check of the mechanical unit adjustment [→ 154].

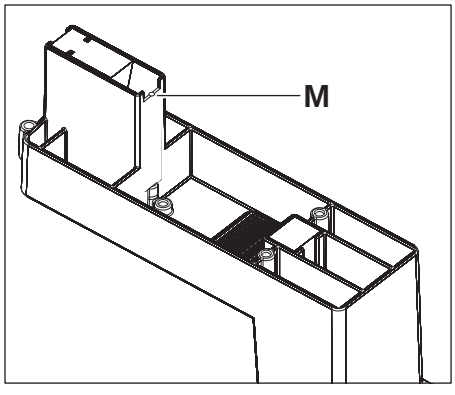
7.2 Checking the mechanical system adjustment

1. Insert the constancy test phantom in the bite block holder of the unit.









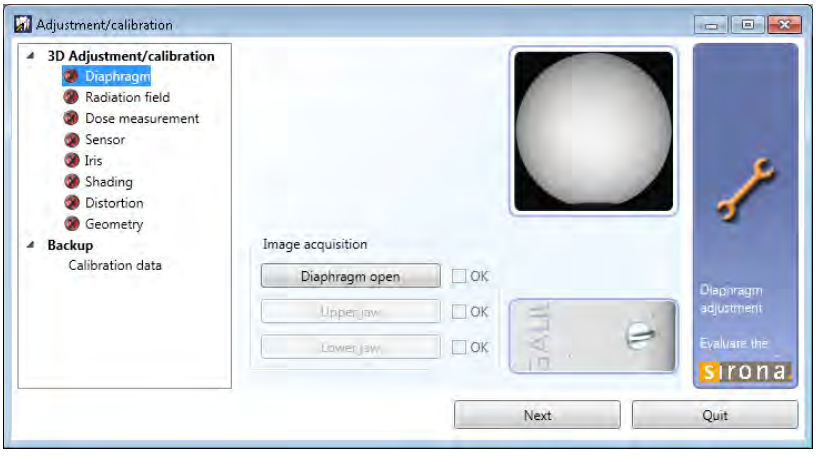
2. Measure distances **B1**, **B2**and **B3** between the tube assembly housing and measuring point **M** on the constancy test phantom (positions **1**, **2** and **3**) using the steel tape measure from the service set.
3. Then calculate the ideal distance between the tube assembly and measuring point **M** as follows: **(B1+B2)/2 = ideal distance**
4. Distances **B1**, **B2** and **B3** must not deviate more than ± 2 mm from the calculated ideal distance. With deviations exceeding ±2mm, the unit must be adjusted mechanically via the position of the ring motor [→ 169].

7.3 Adjustment and calibration via the "Service Functions" menu

IMPORTANT

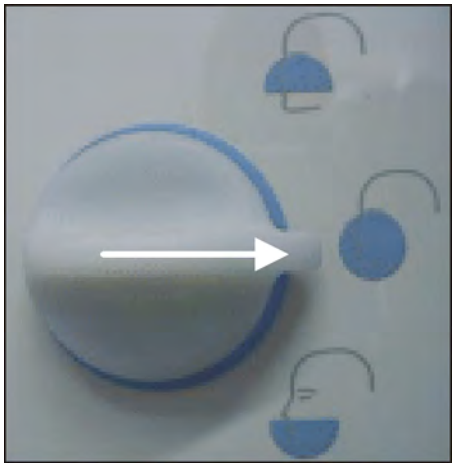
After every calibration of the unit, the reference values for the constancy measurement must be recalculated and entered in the "Test results" form, "Reference value" column.

7.3.1 Diaphragm image



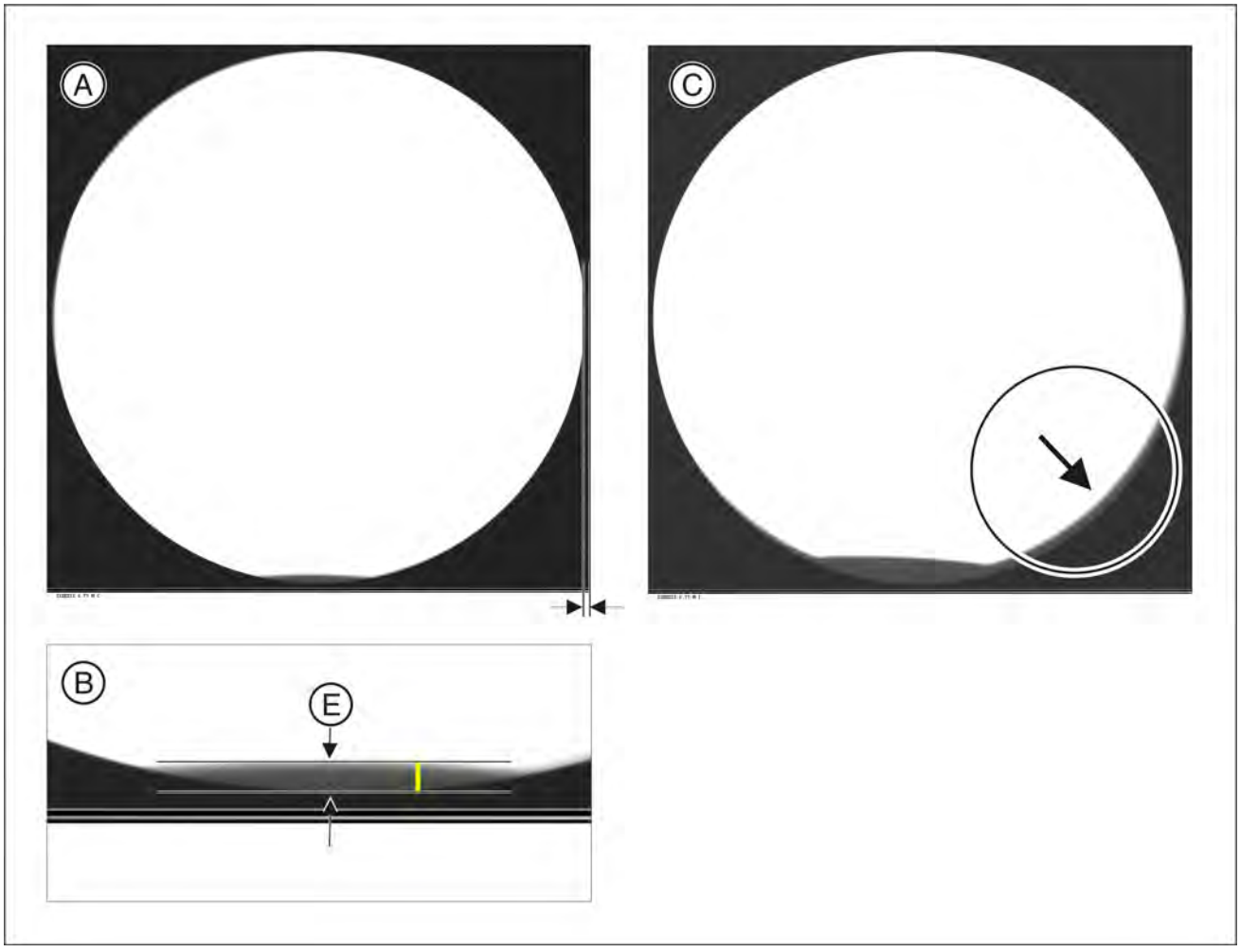
1. Call the *"Adjustment/calibration"* menu [→ 147].
2. In the structure tree, under *"3D Adjustment/calibration"*, click on the *"Diaphragm"* element (S030.5).
   ↳ The *"Diaphragm"* menu is displayed in the action area.

Adjusting the "diaphragm open" diaphragm setting



1. Set the rotary knob on the tube assembly to the "open diaphragm" position.

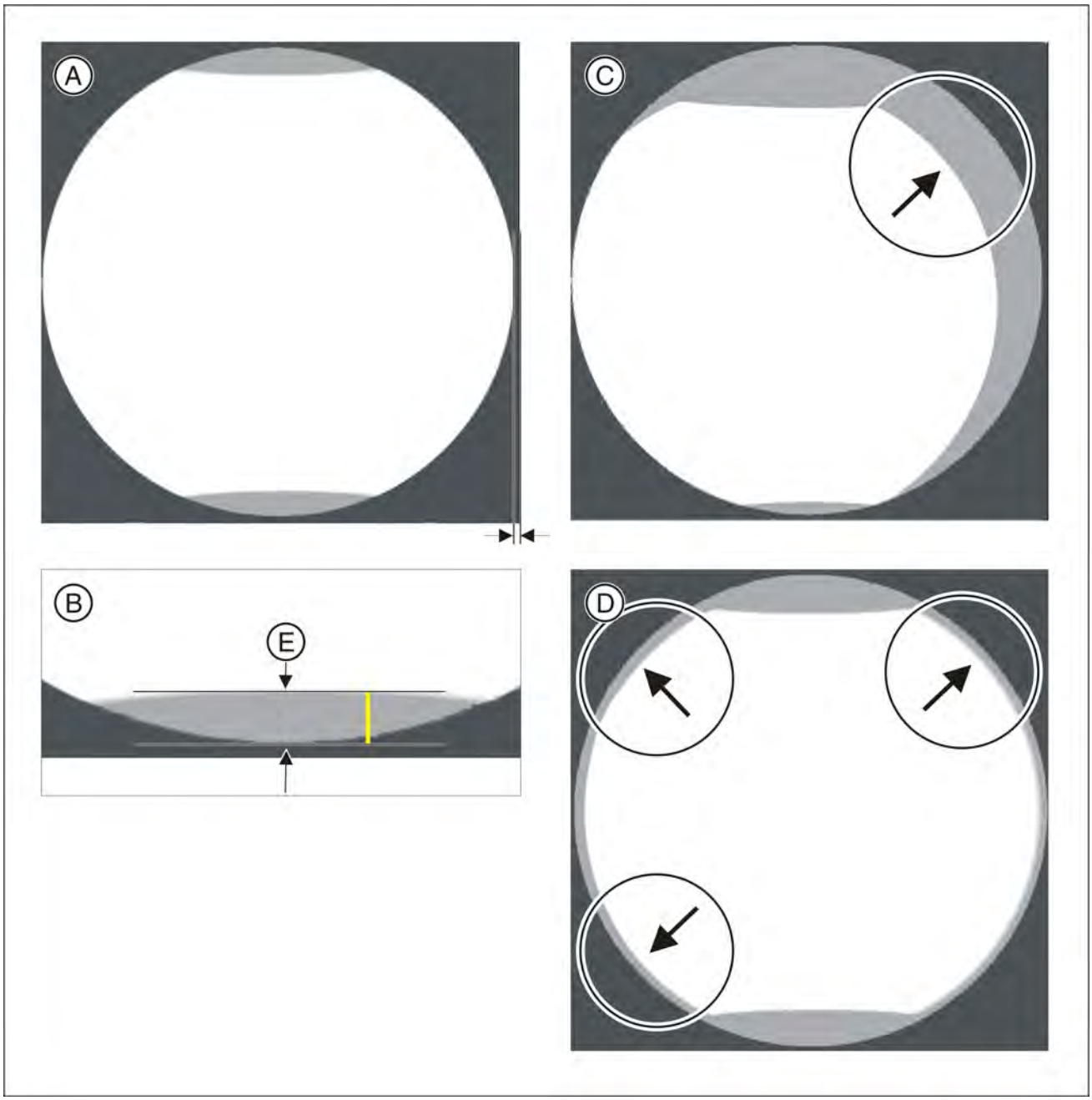
2. Click on the *"Diaphragm open"* button in the *"Image acquisition"* menu area.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S030.5 is displayed on the control panel.
3. Take an exposure [→ 151].
4. For GALILEOS Comfort and GALILEOS Comfort^{PLUS}: Evaluate the image.



A+B	Adjustment OK
C	Adjustment not OK
E	Permissible tolerance: 30 pixels ± 5 pixels

- The brightness distribution along the border surrounding the image on all sides must be uniform (**A**).
- The distance between the bottom edge and the lowest point in the image should be 30 ± 5 pixels (measure with SIDEXIS scale) (**B**).
  If the distance between the bottom edge and the lowest point in the image is out of tolerance (**E**) or the brightness distribution along the surrounding border is not uniform (**C**), the diaphragm must be adjusted mechanically [→ 171].

5. For GALILEOS Compact:
   Evaluate the image.



A+B	Adjustment OK
C	Adjustment not OK, diaphragm not centered
P	Adjustment not OK, diaphragm too small
E	Permissible tolerance: 65 pixels ± 5 pixels

- The brightness distribution along the surrounding border must be uniform (**A**).
  A shadow in the image indicates horizontal or vertical displacement of the diaphragm.

↳ The distance between the bottom edge and the lowest point in the image should be 65 ± 5 pixels (measure with SIDEXIS scale). No surrounding gray shadow should be visible (**D**).
A surrounding gray shadow in the image indicates that the diaphragm is too small.
If the distance between the bottom edge and the lowest point in the image is out of tolerance (**E**), or the brightness distribution along the surrounding border is not uniform (**C**), or a surrounding gray shadow is visible in the image (diaphragm opening too small) (**D**), the diaphragm must be adjusted mechanically [→ 171].

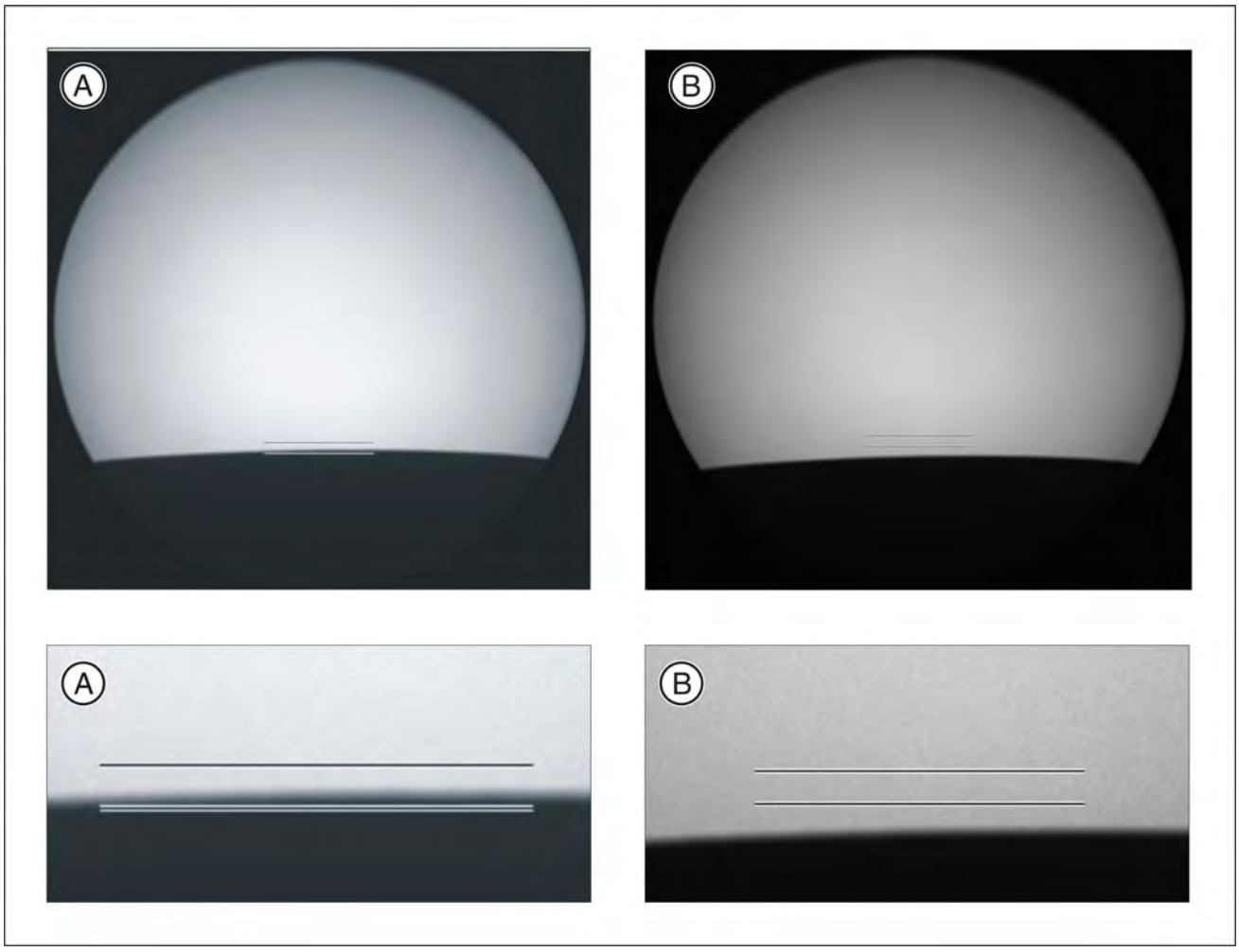
6. If the exposure is OK (**A**+**B**), confirm this by clicking the check box located to the right of the *"Diaphragm open"* button.
   ↳ The box will appear checked.
   ↳ The adjustment for the "open diaphragm" diaphragm setting is now complete.
   ↳ The *"Diaphragm open"* button is selectable in the *"Image acquisition"* menu area.
7. Continue the calibration procedure with the adjustment of the "upper jaw" diaphragm setting.

Adjustment of the "Upper jaw" diaphragm setting

✓ The *"Adjustment/calibration"* menu is called [→ 147].
✓ The element *"Diaphragm"* is selected under *"3D Adjustment/ calibration"* in the structure tree (S030.5).
✓ The *"Upper jaw"* button is selectable in the *"Image acquisition"* menu area.

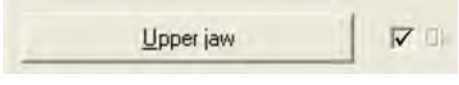
1. Click on the *"Upper jaw"* button in the *"Image acquisition"* menu area.
   ↳ The *"Diaphragm"* menu is displayed in the action area.

2. Set the rotary knob on the tube assembly to the "maxillary exposure" position.
3. Click the *"Upper jaw"* button.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S030.5 is displayed on the control panel.
4. Take an exposure [→ 151].
5. Evaluate the image.



A	Adjustment OK
B	Adjustment not OK

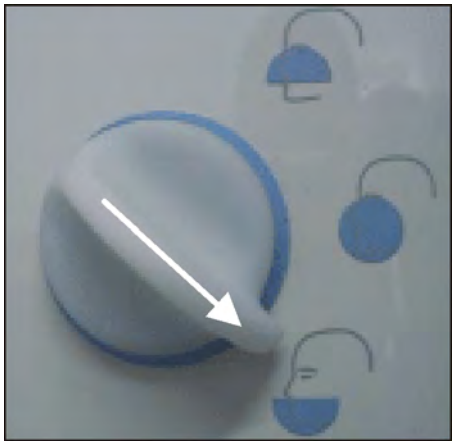
↳ The upper edge of the lower lead diaphragm must be within tolerance, i.e. lie inside of the auxiliary lies (**A**).
If the edge is out of tolerance (**B**), the diaphragm must be adjusted mechanically [→ 171].



6. If the exposure is OK (**A**), confirm this by clicking the check box located to the right of the *"Upper jaw"* button.
   ↳ The box will appear checked.
   ↳ The adjustment for the "Upper jaw" diaphragm setting is now complete.
   ↳ The *"Lower jaw"* button is selectable.
7. Continue the calibration procedure with the adjustment of the "Lower jaw" diaphragm setting.

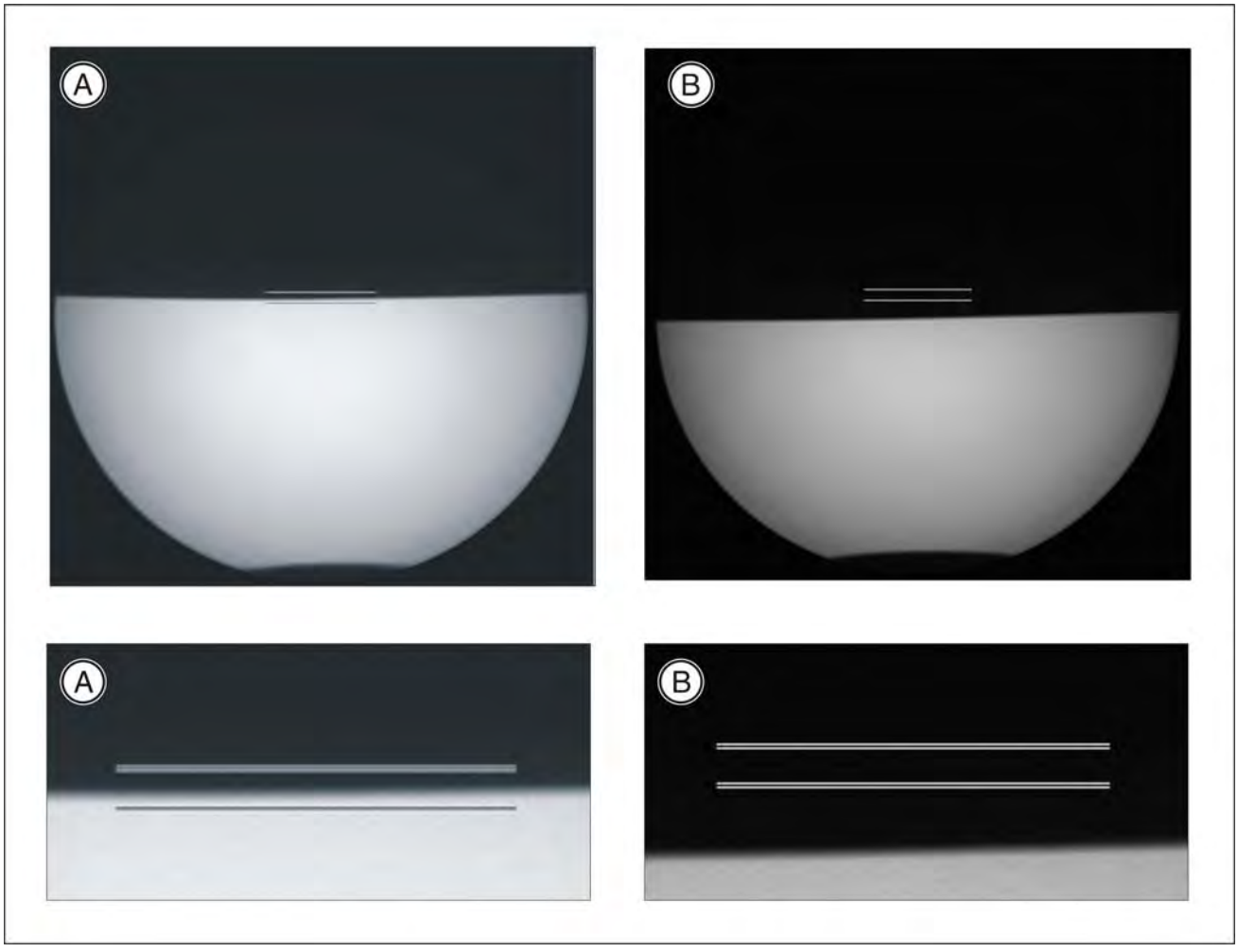
Adjustment of the "Lower jaw" diaphragm setting

✓ The *"Adjustment/calibration"* menu is called [→ 147].
✓ The element *"Diaphragm"* is selected under *"3D Adjustment/calibration"* in the structure tree (S030.5).



✓ The *"Lower jaw"* button is selectable in the *"Image acquisition"* menu area.

1. Set the rotary knob on the tube assembly to the "lower jaw" position.
2. Click the *"Lower jaw"* button.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S030.5 is displayed on the control panel.
3. Take an exposure [→ 151].
4. Evaluate the image.



A	Adjustment OK
B	Adjustment not OK

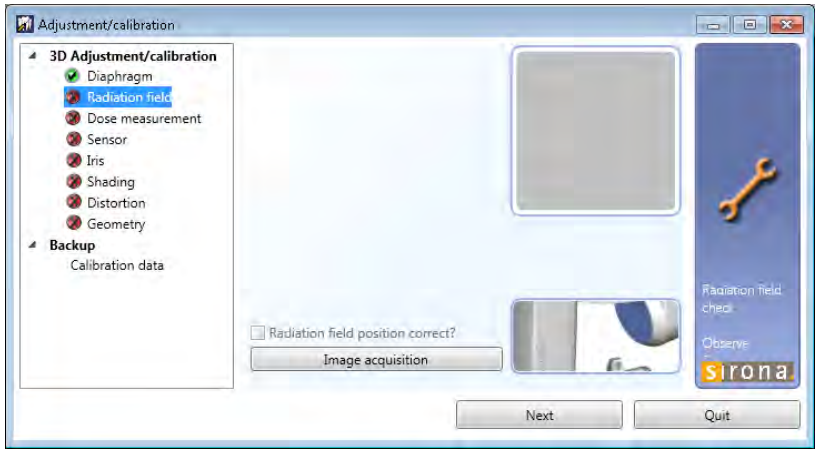
↳ The lower edge of the upper lead diaphragm must be within tolerance, i.e. lie inside of the auxiliary lines (**A**).

If the edge is out of tolerance (**B**), the diaphragm must be adjusted mechanically [→ 171].

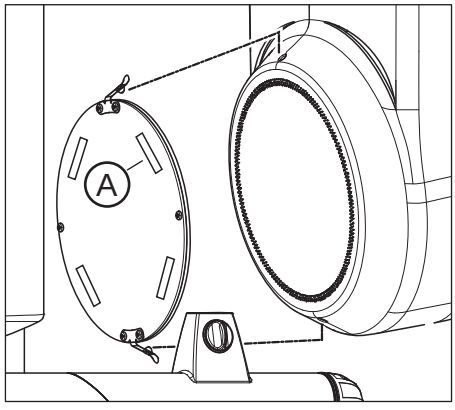
5. If the exposure is OK (**A**), confirm this by clicking the check box located to the right of the *"Lower jaw"* button.
   - ↳ The box will appear checked.
   - ↳ Diaphragm adjustment is now complete.
6. Continue the calibration procedure with the radiation field check [→ 161].

7.3.2 Checking the radiation field

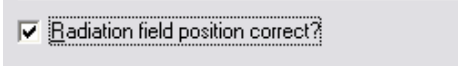
IMPORTANT: The illumination must be checked once the collimator has been adjusted.



✓ The *"Adjustment/calibration"* menu is called [→ 147].



1. Clip the distortion phantom onto the X-ray detector cover. [→ 152]
2. In the structure tree, under *"3D Adjustment/calibration"*, click on the *"Radiation field"* element (S002.6).
   - ↳ The *"Radiation field"* menu is displayed in the action area.
3. Click the *"Image acquisition"* button.
   - ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   - ↳ Service routine S002.6 is displayed on the control panel.
4. Press the R key to move the unit back to the starting position.
5. Press the release button. Hold down the release button and observe the distortion phantom. The lighting strips on the distortion phantom (**A**) must not light up.
   If the strips on the phantom light up at all, the system is overexposed, and you cannot continue the adjustment. In this case, repeat the diaphragm adjustment procedure and then check the radiation beam field again. If the lighting strips still light up during the re-check of the beam field, contact the SIRONA Customer Service Center (CSC) to solve the problem.



6. To confirm that the lighting strips on the distortion phantom are *not* lit, click the check box on the left next to the text *"Radiation field position correct?"*.

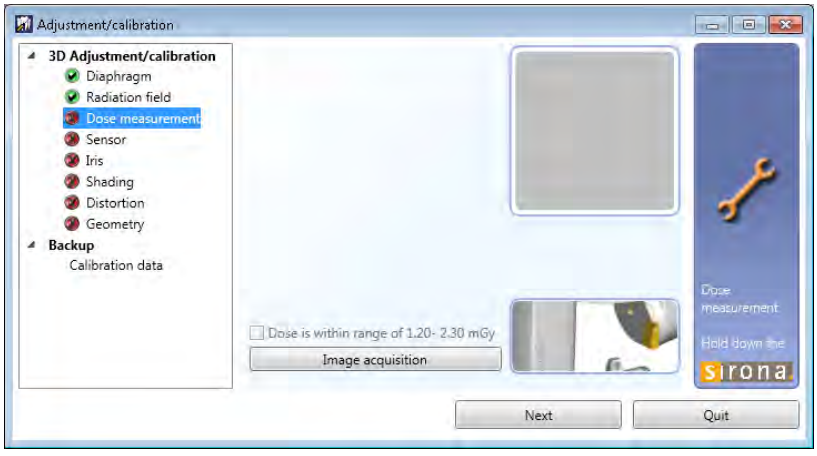
↳ The box will appear checked.

↳ The beam field check is now completed.

7. Continue the calibration procedure with the dosimetry [→ 162].
Tip: Leave the distortion phantom on the unit for the next calibration step.

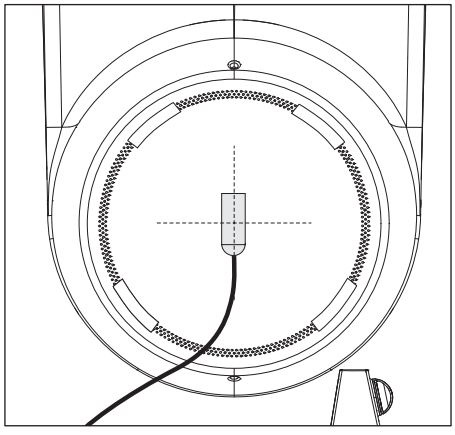
7.3.3 Dosimetry

A dosimeter for pulsed radiation (e.g. Mult-O-Meter 512L) is required for dosimetry.

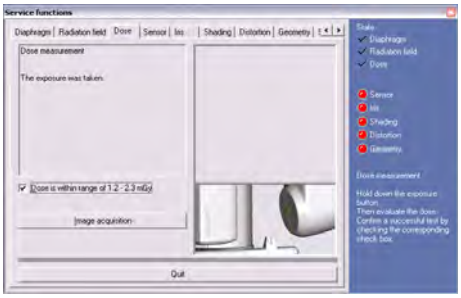


✓ The Adjustment/calibration menu is called [→ 147].

✓ The distortion phantom is clipped onto the cover of the X-ray detector for protection against scratching.

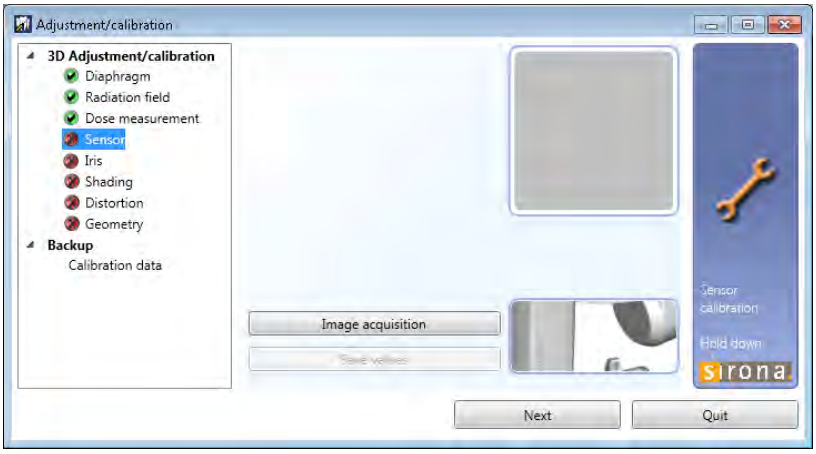


1. Attach the Mult-O-Meter sensor approximately in the middle of the distortion phantom mounted on the X-ray detector.
2. In the structure tree, under 3D Adjustment/calibration, click on the *"Dose measurement"* element (S002.6).
   ↳ The *"Dose measurement"* menu is displayed in the action area.
3. Click the *"Image acquisition"* button.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S002.6 is displayed on the control panel.
4. Press the R key to move the unit back to the starting position.
5. Press the release button. Press and hold down the button until the exposure is complete, the preview image is displayed in the exposure window, and the acoustic signal indicating the end of the exposure (double beep) sounds (if it has been configured).
6. Then read off the dose from the Mult-O-Meter.
   For GALILEOS Compact / Comfort, the value must be between 1.2 and 2.3 mGray.
   For GALILEOS Comfort^{PLUS}, the value must be between 2.3 and 4.5 mGray.
   If the value is outside the permissible range, check the X-ray tube assembly.



7. To confirm that the dose is within the *permissible range between 1.2 and 2.3 mGray/2.3 and 4.5 mGray*, click the check box on the left next to the text.
   ↳ The box will appear checked.
   ↳ The dosimetry is now complete.
8. Remove the sensor from the distortion phantom and take the phantom off the X-ray detector.
9. Continue the calibration procedure with the sensor adjustment [→ 163].

7.3.4 Sensor adjustment

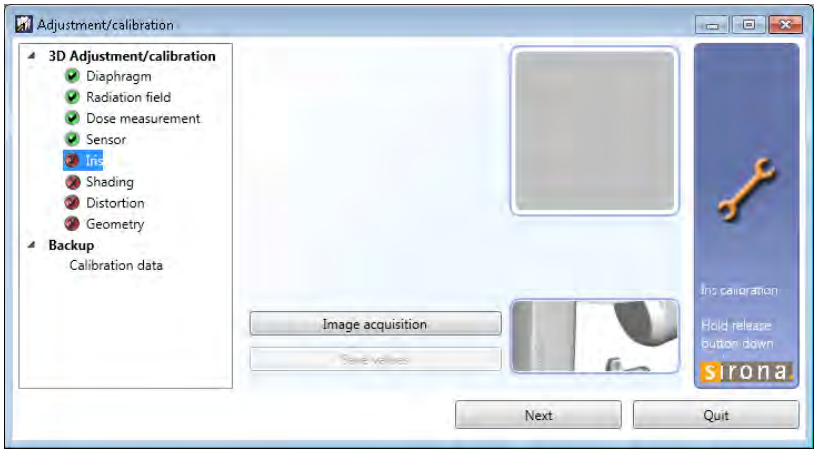


✓ The Adjustment/calibration menu is called [→ 147].

1. In the structure tree under *"3D Adjustment/calibration"*, click on the *"Sensor"* element (S010.14).
   ↳ The *"Sensor"* menu is displayed in the action area.
2. Click the *"Image acquisition"* button.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S010.14 is displayed on the control panel.
3. Press the R key to move the unit back to the starting position.
4. Press the release button. Press and hold down the button until the exposure is complete, the preview image is displayed in the exposure window, and the acoustic signal indicating the end of the exposure (double beep) sounds (if it has been configured).
   IMPORTANT: This process takes approx. 2-3 minutes.
   ↳ The unit transfers the acquired images to the Reconstruction and Control Unit (RCU). This process can take 2-3 minutes. Once the transfer is complete, the evaluation of the sensor calibration is displayed in the message window.
   If the information in the message window indicates that calibration is *not OK and/or not possible*, keep repeating the procedure starting with Step b) until calibration is OK and/or possible.
   If you have repeated the procedure three times and still have not attained a positive result, please contact the SIRONA Customer Service Center (CSC).

5. If the adjustment is OK or possible, click the *"Save values"* button.
   ↳ The adjustment is saved.
   ↳ The sensor adjustment is now complete.
6. Continue the calibration procedure with the iris adjustment [→ 164].

7.3.5 Iris adjustment

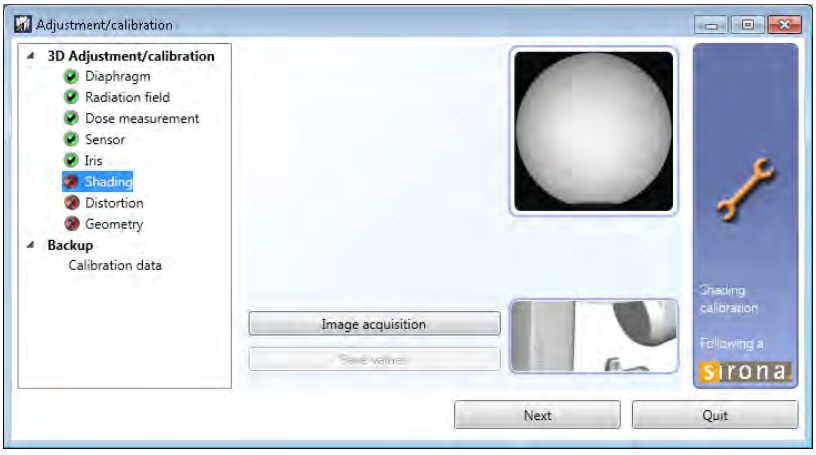


✓ The *"Adjustment/calibration"* menu is called [→ 147].

1. In the structure tree under *"3D Adjustment/calibration"*, click on the *"Iris"* element (S010.10).
   ↳ The *"Iris"* menu is displayed in the action area.
2. Click the *"Image acquisition"* button.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S010.10 is displayed on the control panel.
3. Press the R key to move the unit back to the starting position.
4. Press the release button. Press and hold down the button until the exposure is complete, the preview image is displayed in the exposure window, and the acoustic signal indicating the end of the exposure (double beep) sounds (if it has been configured).
   IMPORTANT: This process takes approx. 2-3 minutes.
   ↳ The unit transfers the acquired images to the Reconstruction and Control Unit (RCU). This process can take 2-3 minutes. Once the transfer is complete, the evaluation of the sensor calibration is displayed in the message window.
   If the information in the message window indicates that calibration is *not OK and/or not possible*, keep repeating the procedure starting with Step b) until calibration is OK and/or possible.
   If you have repeated the procedure three times and still have not attained a positive result, please contact the SIRONA Customer Service Center (CSC).
5. If the calibration is OK or possible, click the *"Save values"* button.
   ↳ The adjustment is saved.
   ↳ The iris adjustment is now complete.

6. Continue the calibration procedure with the shading calibration [→ 165].

7.3.6 Shading calibration



✓ The *"Adjustment/calibration"* menu is called [→ 147].

1. In the structure tree under *"3D Adjustment/calibration"*, click on the *"Shading"* element (S010.11 / S010.15).
   ↳ The *"Shading"* menu is displayed in the action area.
2. Click the *"Image acquisition"* button.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S010.11 or S010.15 (extended shading calibration) is displayed on the control panel.
3. Press the R key to move the unit back to the starting position.
4. Press the release button. Press and hold down the button until the exposure is complete, the preview image is displayed in the exposure window, and the acoustic signal indicating the end of the exposure (double beep) sounds (if it has been configured).
   ↳ The shading exposure and the evaluation of the shading calibration is displayed.
   If the information in the message window indicates that calibration is *not OK and/or not possible*, keep repeating the procedure starting with Step b) until calibration is OK and/or possible.
   If you have repeated the procedure three times and still have not attained a positive result, please contact the SIRONA Customer Service Center (CSC).
   IMPORTANT: No foreign bodies may be visible on the shading exposure. If this is the case, check the beam path for foreign bodies, remove them if necessary and repeat the calibration.

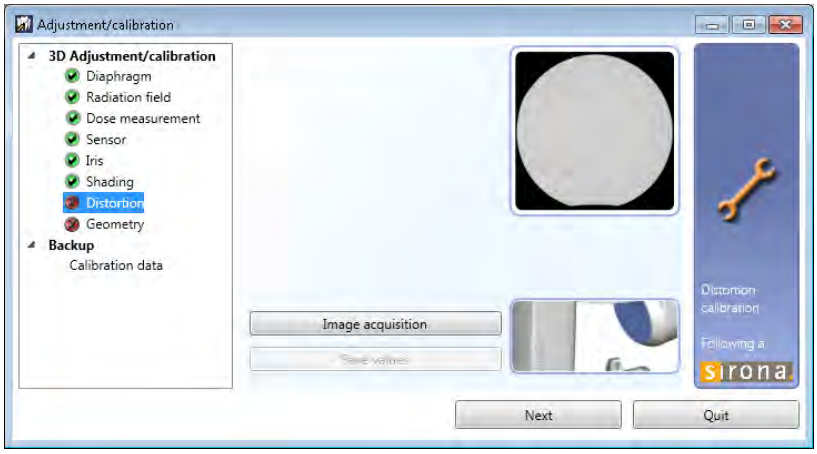
5. If the calibration is OK or possible, click the *"Save values"* button.
   ↳ The calibration is saved.
   ↳ The shading calibration is now complete.
6. Continue the calibration procedure with the distortion calibration [→ 166].

7.3.7 Distortion calibration

IMPORTANT

With GALILEOS Comfort^{PLUS}:

With GALILEOS Comfort^{Plus}, the distortion phantom delivered with the device must be used. Distortion phantoms with a serial number <3001 may not be used for the calibration of GALILEOS Comfort^{PLUS}.



✓ The *"Adjustment/calibration"* menu is called [→ 147].

1. In the structure tree under *"3D Adjustment/calibration"*, click on the *"Distortion"* element (S010.12).
   ↳ The *"Distortion"* menu is displayed in the action area.
2. Clip the distortion phantom onto the X-ray detector cover [→ 152].
3. Click the *"Image acquisition"* button.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S010.12 is displayed on the control panel.
4. Press the R key to move the unit back to the starting position.
5. Press the release button. Press and hold down the button until the exposure is complete, the preview image is displayed in the exposure window, and the acoustic signal indicating the end of the exposure (double beep) sounds (if it has been configured).
   IMPORTANT: This process takes approx. 2-3 minutes.
   ↳ The unit transfers the acquired images to the Reconstruction and Control Unit (RCU). This process can take 2-3 minutes. Once the transfer is complete, the evaluation of the distortion calibration is displayed in the message window.
   If the information in the message window indicates that calibration was not successful, check the calibration phantom to make sure that it is not damaged.
   If the phantom checks out OK (all balls are present and correctly positioned), repeat the procedure starting with point d) as often as required until the calibration is OK.
   If you have repeated the procedure three times and still have not attained a positive result, please contact the SIRONA Customer Service Center (CSC).

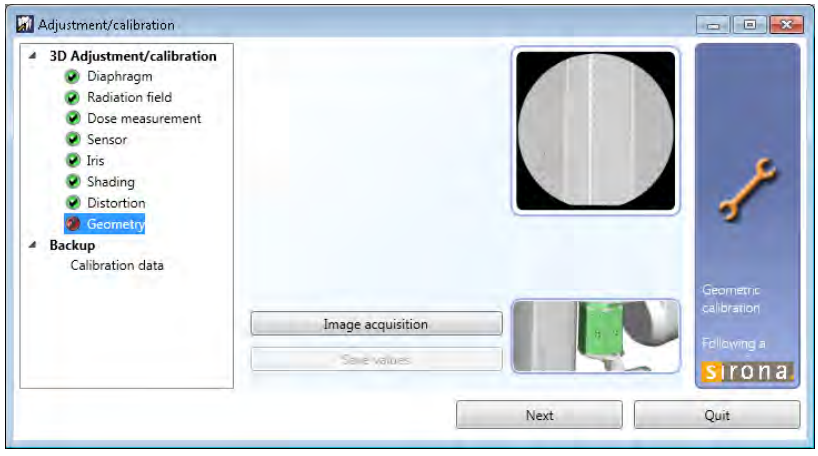
6. **IMPORTANT:** When a new distortion calibration is saved, the geometric calibration is set to "invalid" (red LEDs).
   If the calibration is OK or possible, click on the *"Save values"* button.
   ↳ The calibration is saved.
   ↳ The distortion calibration is now complete.
7. Remove the distortion phantom again from the X-ray detector cover.
8. Continue the calibration procedure with the geometry calibration [→ 167].

7.3.8 Geometry calibration

IMPORTANT

For an installed and configured FACESCAN:

The face scanner is automatically calibrated during the geometry calibration of GALILEOS. In this case, make sure that the normal room lighting is switched on during the calibration process. The room does not have to be darkened during calibration.



✓ The *"Adjustment/calibration"* menu is called [→ 147].

1. In the structure tree, under *"3D Adjustment/calibration"*, click on the *"Geometry"* element (S010.13).
   ↳ The *"Geometry"* menu is displayed in the action area.
2. Insert the geometric phantom in the bite block holder of the unit [→ 152]. Align the phantom with a spirit level.
3. For FACESCAN: Check to make sure that the room lighting is switched on. Switch it on if necessary.
4. Click the *"Image acquisition"* button.
   ↳ SIDEXIS XG makes the unit ready for exposure [→ 151].
   ↳ Service routine S010.13 is displayed on the control panel.
5. Press the R key to move the unit back to the starting position.
6. Press the release button. Press and hold down the button until the exposure is complete, the preview image is displayed in the exposure window, and the acoustic signal indicating the end of the exposure (double beep) sounds (if it has been configured).
   IMPORTANT: This process takes approx. 2-3 minutes.

↳ The unit transfers the acquired images to the Reconstruction and Control Unit (RCU). This process can take 2-3 minutes. Once the transfer is complete, the evaluation of the calibration is displayed in the message window.
If the information in the message window indicates that calibration was not successful, check the calibration phantom to make sure that it is not damaged.
If you have repeated the procedure three times and still have not attained a positive result, check the mechanical geometry of the unit [→ 154]. Adjust the unit if necessary and then repeat the calibration.
If this still does not lead to a positive result, please contact the SIRONA Customer Service Center (CSC).

7. If the calibration is OK or possible, click the *"Save values"* button.
   ↳ The calibration is saved.
   ↳ Calibration of the geometry is now complete.
8. Remove the geometric phantom from the bite block holder of the unit.

7.4 Performing a white balance for FaceScan

IMPORTANT
Constant lighting conditions If the lighting conditions during the white balance process are different from those during the subsequent FaceScan process, this will lead to inaccurate colors. ➢ Ensure that the lighting conditions during white balancing correspond with those of the later FaceScan operation.

Without white balance the pictures will be tinged.

A white balance can be performed during:

- The first installation
- Making changes to environmental lighting
- Following a software update

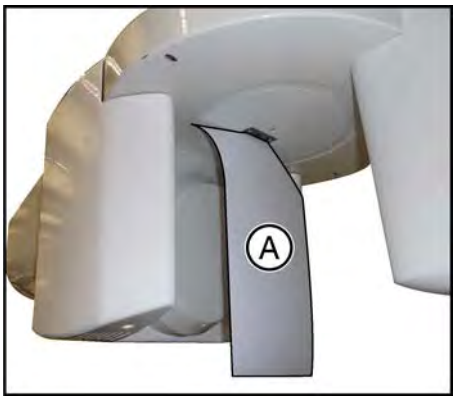
Opening the web dialog

1. In SIDEXIS Manager, start the *"Facescan Configuration"* application.
2. Click on the *"Facescanner in browser"* button.
   ↳ A password dialog box opens.
3. In the field *"User"* enter *"service"*.
4. In the field *"Password"* enter *"sirona"*.

↳ The *"Facescan Device Service "* web dialog opens.

White balance (type 1)

✓ 1 white sheet of paper (such as DIN A3)



1. Attach the sheet of paper (A) to where the patient's head goes, so that the cameras are pointed at the white surface area.
2. Select the menu item *"SERVICE"*.
3. Press the *"Enter Auto White Balance"* button.
   ↳ The *"Auto White Balance"* dialog box opens.
4. Wait until the status LEDs light up.
5. Press the *"Auto White Balance"* button.
   ↳ The white balance starts. During this time, the LEDs of the Facescan are on for the duration of the white balance.
   The white balance takes a minimum of 2 minutes (up to 20 minutes in the event of errors).
   In the event of errors: If the white balance does not work, then the white balance procedure must be repeated.

↳ The Facescan restarts.

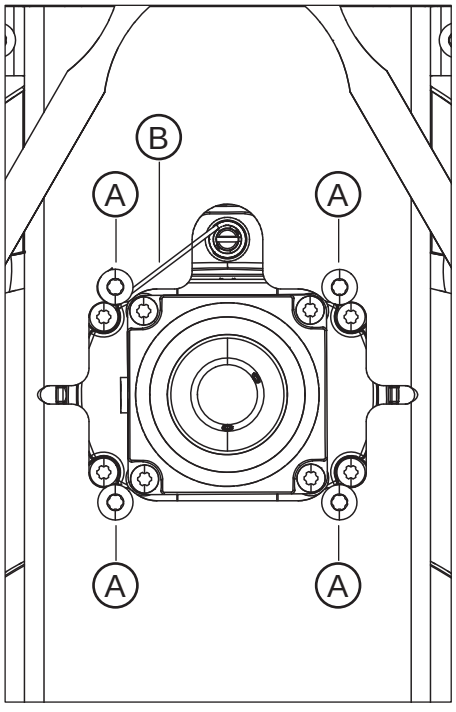
↳ The white balance is complete

7.5 Mechanical adjustments

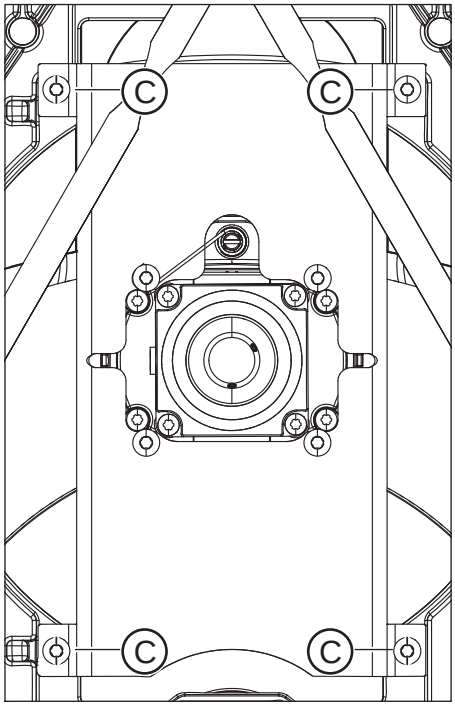
7.5.1 Ring center adjustment

NOTICE

Perform this adjustment only if the measured values are out of tolerance [→ 154].



1. Remove the "arm cover".
2. *Move the ring center to the left or right:*
   NOTICE! Do not undo the screws completely! Make sure that spring (B) does not pop out. This spring has a defined prestress!
   Loosen the four screws (**A**) slightly.
3. Correct the position carefully and then retighten the screws.

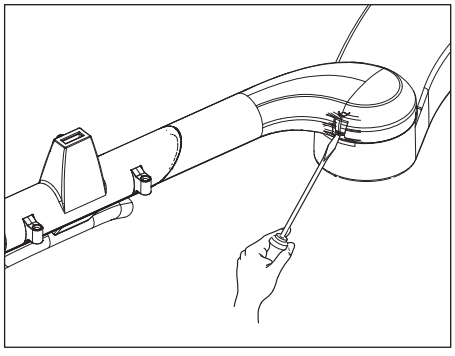


4. *Move the ring center to the left or right:*
NOTICE! Do not undo the screws completely!
Loosen the four screws (**C**) slightly.
5. Correct the position carefully and then retighten the screws.
If the center of the ring cannot be fully adjusted using the screws (**C**) then proceed with adjusting the swivel arm. Otherwise, the mechanical adjustment is now complete and you may begin calibration.
6. Re-attach the "arm cover".

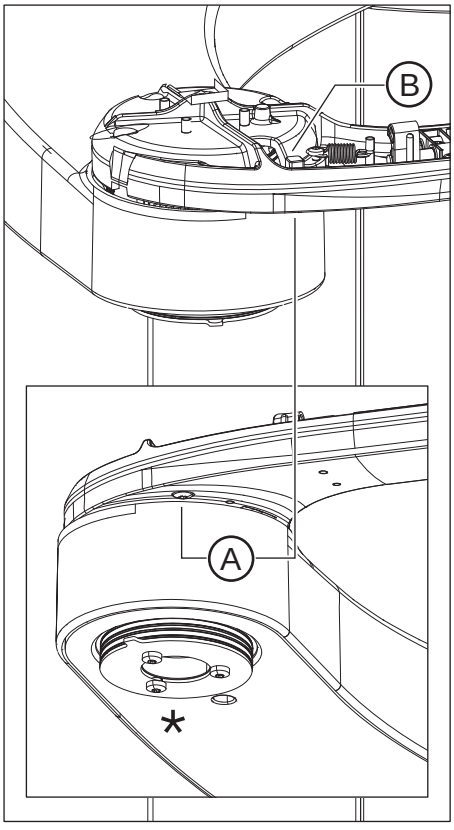
7.5.2 Adjusting the swivel arm

NOTICE

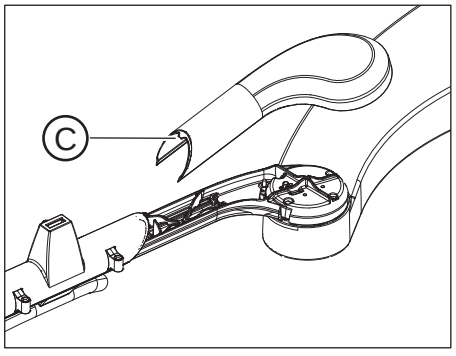
Perform this adjustment only if the measured values are out of tolerance [→ 154].



1. Remove the "swivel arm cover".
Move the swivel arm to the entry position, loosen the internal grid, slightly bend the housing upwards and remove it by pulling towards the pivot joint of the swivel arm.



2. Loosen screw (**A**) slightly.
3. **NOTICE! Do not forget to tighten screw (A) again. Otherwise, the clearance and play of the swivel arm is not ensured!**
   Adjust the swivel arm with the eccentric screw (**B**). Hold the eccentric screw securely in place and tighten screw (**A**) again.
   IMPORTANT: The swivel arm is shown here without the control panel for purposes of clarity (*****).



4. Re-attach the "swivel arm cover".
   To do this, position the nose (**C**) in the groove of the swivel arm and press the cover on until it snaps in place.

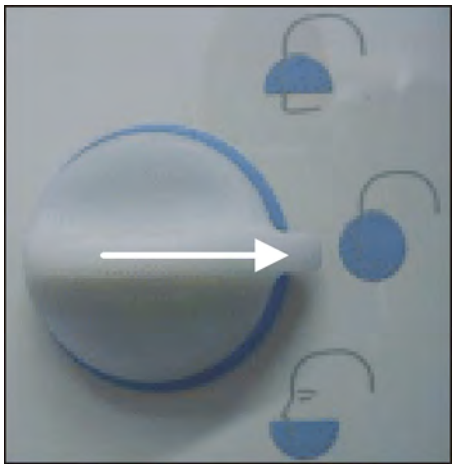
7.5.3 Diaphragm adjustment

Preparations

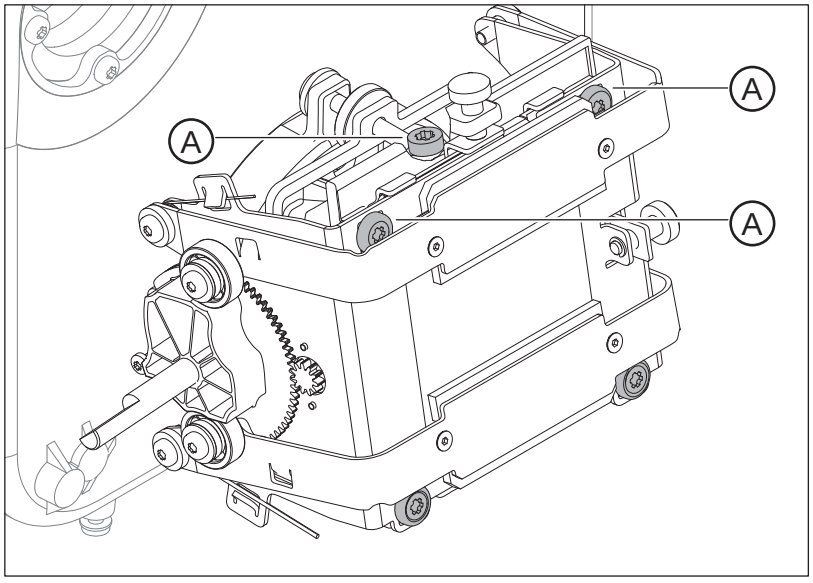
1. Pull off the adjusting knob with the silicone ring.
2. Remove the "Front tube assembly" and "Rear tube assembly" covers.

Adjusting the complete diaphragm unit

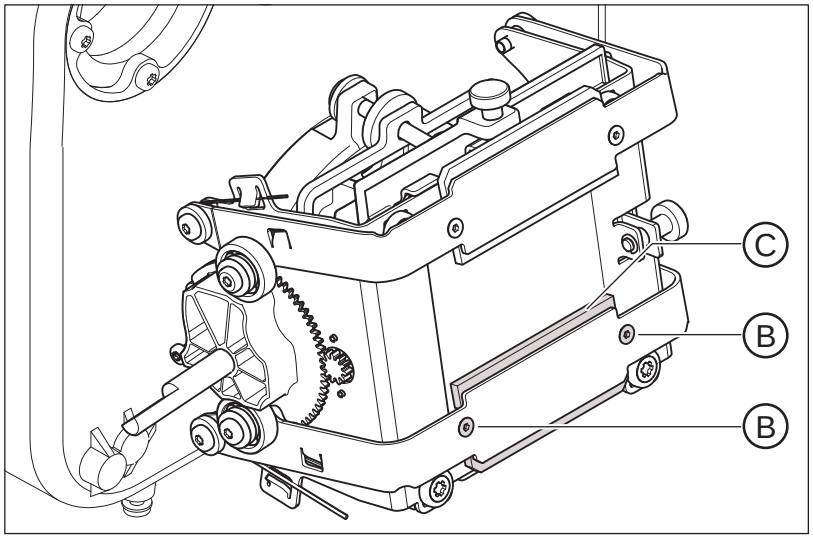
If the exposure taken in the "diaphragm open" diaphragm setting is not OK, the complete diaphragm unit must be adjusted.



1. Set the rotary knob on the tube assembly to the "open diaphragm" position.



2. Loosen the five screws (**A**) (but do not remove them).

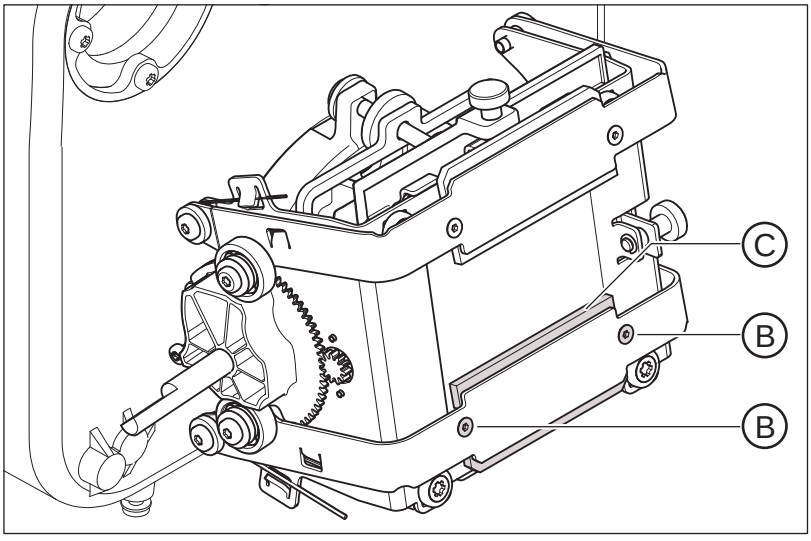


3. If necessary, use the adjustment screws to adjust the diaphragm in the **X**, **Y** or **Z** direction.
   CW rotation of screws:
   Moves the diaphragm in the *X, Y or Z direction*
   CCW rotation of the screws:
   Moves the diaphragm in the direction opposite to the *X, Y or Z direction*
4. Retighten the five screws (**A**) firmly.
5. Repeat the diaphragm exposure.

Adjusting the lower lead diaphragm

If the exposure taken in the "upper jaw" diaphragm setting is not OK, the lower lead diaphragm must be adjusted.

1. Set the rotary knob on the tube assembly to the "maxillary exposure" position.

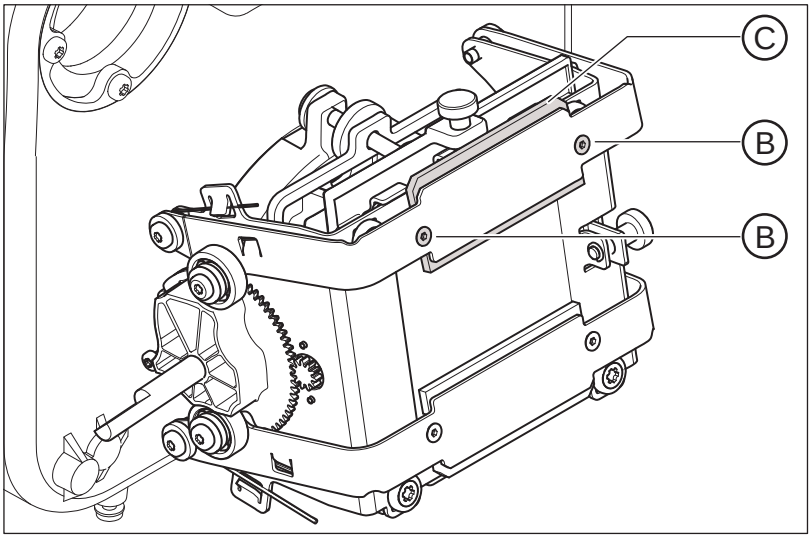


2. Loosen both screws (**B**) of the lead diaphragm.
3. Manually adjust lead diaphragm (**C**).
4. Tighten both screws (**B**) firmly.
5. Repeat the diaphragm exposure.

Adjusting the upper lead collimator

If the exposure taken in the "lower jaw" diaphragm setting is not OK, the upper lead diaphragm must be adjusted.

1. Set the rotary knob on the tube assembly to the "lower jaw" position.



2. Loosen both screws (**B**) of the lead diaphragm.
3. Manually adjust lead diaphragm (**C**).
4. Tighten both screws (**B**) firmly.
5. Repeat the diaphragm exposure [→ 155].

8 Perform service routines via the control panel

8.1 Overview of service routines

8.1.1 List of all service routines available for selection

Service routine	Function	see
S002	**Radiation without rotary movement, selectable kV/mA level and maximum radiation time**	S. [→ 191]
S002.5	Long-term exposure with fixed radiation intervals from any position	S. [→ 191]
S005	**General X-ray tube assembly service**	S. [→ 192]
S005.1	(for internal Sirona purposes only)	
S005.3	(for internal Sirona purposes only)	
S005.4	Fan test	S. [→ 193]
S005.5	Temperature sensor test, single tank	S. [→ 193]
S005.8	Automatic adjustment of pulse preheating	S. [→ 194]
S007	**Error logging memory**	S. [→ 196]
S007.1	Display error logging memory	S. [→ 196]
S007.2	Clearing error logging memory	S. [→ 198]
S007.5	Enable the CAN bus logging in the Miniweb	S. [→ 200]
S008	**Update service**	S. [→ 203]
S008.2	Overview of the module software versions	S. [→ 203]
S008.3	Confirming the unit serial number	S. [→ 204]
S009	**Flash file system**	S. [→ 205]
S009.4	Formatting flash file system	S. [→ 205]
S009.5	Test flash file system	S. [→ 207]
S009.7	Save/restore DX89 data	S. [→ 209]
S011	**Dosimetry (without ring movement)**	S. [→ 211]
S011.9	Current measurement (unpulsed)	S. [→ 211]
S011.12	Dosimetry with pulsed radiation	S. [→ 212]
S012	**CAN bus service**	S. [→ 213]
S012.1	Presence display of modules	S. [→ 213]
S012.2	Inquiry of the CAN status register of the modules	S. [→ 215]
S012.3	Resetting the CAN status register of the modules	S. [→ 216]
S012.4	Display of CAN bus cycle on the LEDs of the modules	S. [→ 217]
S017	**Configuration service**	S.
S017.2	Configuring the hardware version	S.
S017.3	Enter the country group code	S.
S017.4 ("GALILEOS Comfort"/" GALILEOS Comfort^{PLUS}")	Select a language	S. [→ 221]

Service routine	Function	see
S017.5 ("GALILEOS Comfort"/" GALILEOS Comfort^{PLUS}")	Select a language set	S. [→ 222]
S017.6	Activate the remote control display	S.
S017.7	Configure the switching plate for the swivel arm	S.
S017.9	(for internal Sirona purposes only)	
S017.13 ("GALILEOS Comfort"/" GALILEOS Comfort^{PLUS}")	Enable/disable the welcome screen	S.
S017.14 ("GALILEOS Comfort"/" GALILEOS Comfort^{PLUS}")	Enable/disable certain lines of the welcome screen	S.
S017.15	Activate/deactivate the acoustic signal for end of exposure	S.
S017.25	Select the diaphragm type	S.
S018	**Service for height adjustment**	S. [→ 232]
S018.2	Set the maximum travel height	S. [→ 232]
S018.3	Undo the maximum travel height setting	S. [→ 233]
S018.4	Check the height adjustment sensor system	S. [→ 234]
S037	**Network service**	S. [→ 237]
S037.1	Displaying the network data	S. [→ 237]
S037.2	Setting the default IP address, default gateway address and default subnet mask	S. [→ 239]
S037.3	Configuring boot mode: DYNAMIC (DHCP/AutoIP) / STATIC (fixed address)	S. [→ 241]
S037.4	Manual input of static network settings (IP address, default gateway address, and subnet mask)	S. [→ 243]

8.1.2 Alphabetical list of service routine functions

Function	Service routine	see
Acoustic signal for end of exposure, activate/deactivate	S017.15	S.
Automatic adjustment of pulse preheating	S005.8	S. [→ 194]
Modules, presence display	S012.1	S. [→ 213]
Module software version, show overview	S008.2	S. [→ 203]
Welcome screen, enable/disable	S017.13 ("GALILEOS Comfort"/" GALILEOS Comfort^{PLUS}")	S.
Welcome screen, enable/disable lines	S017.14 ("GALILEOS Comfort"/" GALILEOS Comfort^{PLUS}")	S.
Select the diaphragm type	S017.25	S.
Configuring boot mode: DYNAMIC (DHCP/AutoIP) / STATIC (fixed address)	S037.3	S. [→ 241]
CAN bus logging in the web interface, enable	S007.5	S. [→ 200]
CAN bus cycle, display on the LEDs of the modules	S012.4	S. [→ 217]

Function	Service routine	see
CAN bus, service	S012	S. [→ 213]
CAN status register for the modules, query	S012.2	S. [→ 215]
CAN status register for the modules, reset	S012.3	S. [→ 216]
Long-term exposure with fixed radiation intervals from any position	S002.5	S. [→ 191]
Default gateway address, set to defaults	S037.2	S. [→ 239]
Default gateway address, manual input	S037.4	S. [→ 243]
Dosimetry, with pulsed radiation	S011.12	S. [→ 212]
Dosimetry (without ring movement)	S011	S. [→ 211]
Save/restore DX89 data	S009.7	S. [→ 209]
Error logging memory	S007	S. [→ 196]
Error logging memory, display	S007.1	S. [→ 196]
Error logging memory, clear	S007.2	S. [→ 198]
Remote control, enable/disable display	S017.6	S.
Flash file system	S009	S. [→ 205]
Flash file system, format	S009.4	S. [→ 205]
Flash file system, test	S009.5	S. [→ 207]
Unit serial number, confirm	S008.3	S. [→ 204]
Unit variant, configure	S017.2	S.
Country group code, enter	S017.3	S.
Height adjustment, sensor system test	S018.4	S. [→ 234]
Height adjustment, service	S018	S. [→ 232]
IP address, set to defaults	S037.2	S. [→ 239]
IP address, enter manually	S037.4	S. [→ 243]
Configuration, service	S017	S.
Fan, test	S005.4	S. [→ 193]
Network, service	S037	S. [→ 237]
Displaying the network data	S037.1	S. [→ 237]
Configure the switching plate for the swivel arm	S017.7	S.
Select a language set	S017.5 ("GALILEOS Comfort"/" GALILEOS Comfort^{PLUS}")	S. [→ 222]
Select a language	S017.4 ("GALILEOS Comfort"/" GALILEOS Comfort^{PLUS}")	S. [→ 221]
Radiation without rotary movement, selectable kV/mA level and maximum radiation time	S002	S. [→ 191]
Tube assembly service, general	S005	S. [→ 192]
Current measurement, unpulsed	S011.9	S. [→ 211]
Subnet mask, set to defaults	S037.2	S. [→ 239]
Subnet mask, manual input	S037.4	S. [→ 243]
Temperature sensor test, single tank	S005.5	S [→ 193].
Update, service	S008	S. [→ 203]

Function	Service routine	see
Maximum travel height, set	S018.2	S. [→ 232]
Maximum travel height, undo setting	S018.3	S. [→ 233]

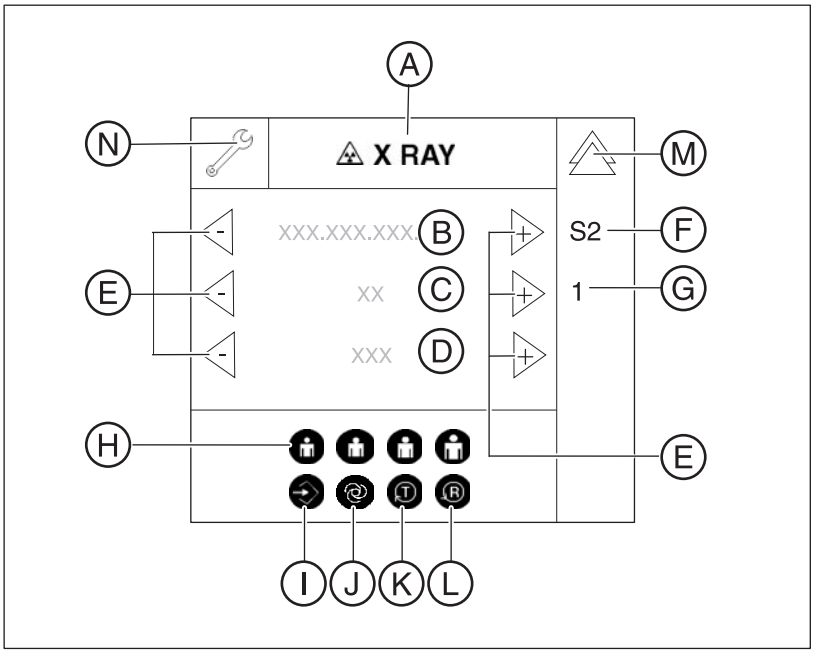
8.2 Service menu and service routines

You can use the service routines to check the function of certain unit components and modules, as well as to set important unit parameters.

8.2.1 Displays and symbols in the service menu

8.2.1.1 Easypad

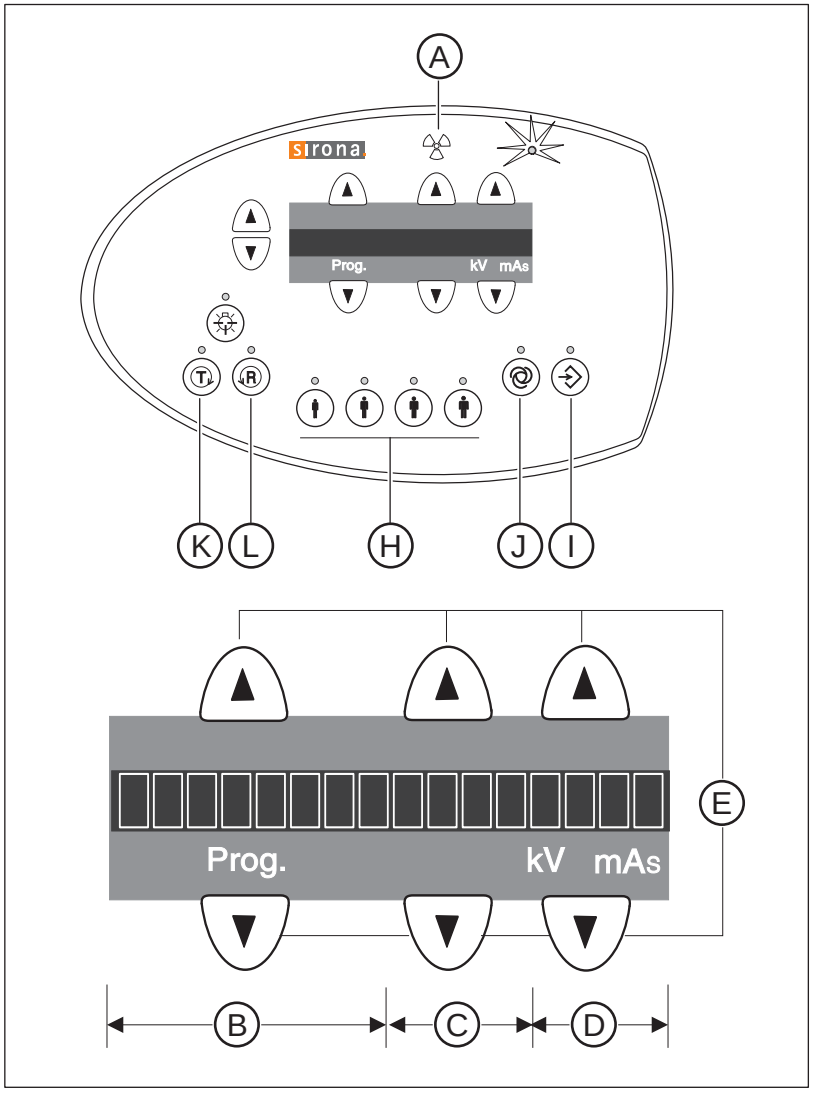
There are many different control symbols and display fields on the touchscreen; these are activated on a context-sensitive basis depending on the procedure step.



A	X RAY	Radiation can be released.
	X RAY Active!	Caution! Radiation is being released.
B	Selection field 1	Display fields for service routines, test steps, values, unit parameters, etc.
C	Selection field 2	
D	Selection field 3	
E	Arrow keys	Touch the "+" and "-" arrow keys to select unit parameters in the selection fields [→ 187].
F	S1 - S37	Selected service routine.
G	1 - n	Selected test step.
H	Patient symbol keys	Different functions, depending on service routine.

I	Memory key	Save selection.
J	Service key	Different functions, depending on service routine. Most, however, confirm a selection or the activation of the next test step.
K	T(est rotation) key	Start a test.
L	R(eturn) key	Move the unit to the starting position or confirm a save operation.
M	Double arrow key	Return to the main menu.
N	Wrench symbol	Displayed if level 4 (service menu) is activated.

8.2.1.2 Multipad



A	X-ray lamp	Caution! Radiation is being released.
B	Selection field 1 (8 digits)	Display fields for service routines, test steps, values, unit parameters, etc.
C	Selection field 2 (4 digits)	
D	Selection field 3 (4 digits)	
E	Arrow keys	Touch the "+" and "-" arrow keys to select unit parameters in the selection fields (Select parameters [→ 187]).
H	Patient symbol keys	Different functions, depending on service routine.
I	Memory key	Save selection.
J	Service key	Different functions, depending on service routine. Most, however, confirm a selection or the activation of the next test step.
K	T(est rotation) key	Start a test.
L	R(eturn) key	Move the unit to the starting position or confirm a save operation.

8.3 Basic operating procedures in the service menu

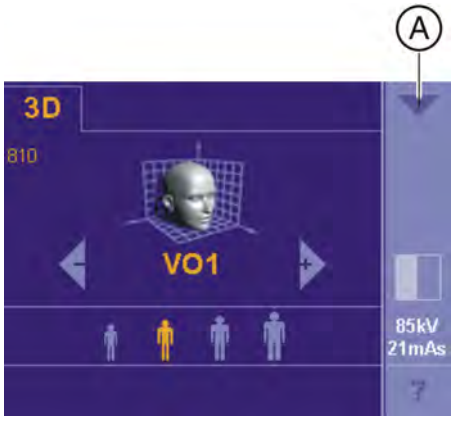
8.3.1 Activating the service menu

8.3.1.1 Easypad

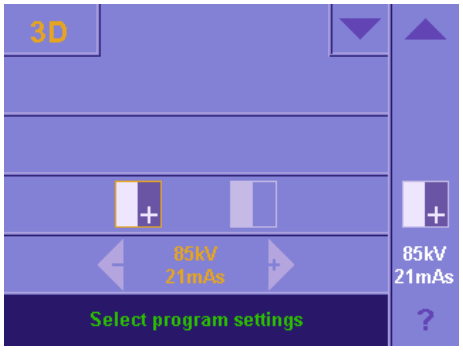
The structure of the touchscreen user interface on the control panel is subdivided into 4 levels:

- **Level 1:** Main menu
- **Level 2:** Program Settings
- **Level 3:** Basic Settings
- **Level 4:** Service menu

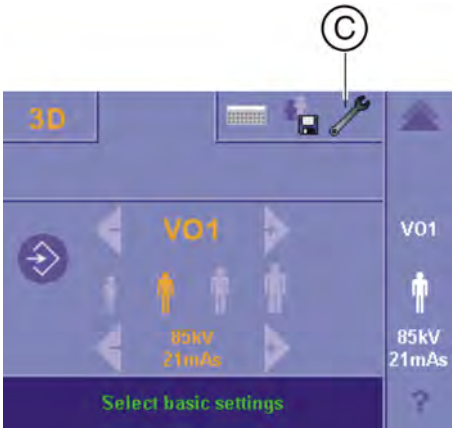
When the unit starts up, the main menu appears on the touchscreen.



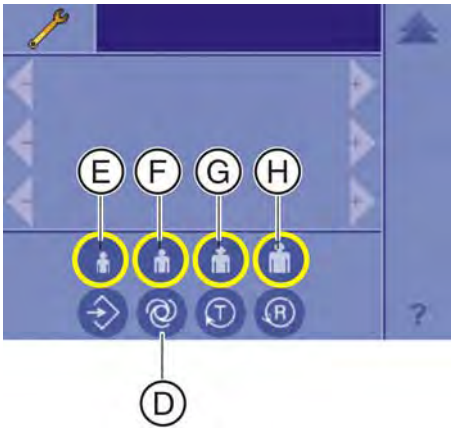
1. To select **level 2** (*"Select program settings"*), touch the blue arrow in the top right corner of the touchscreen (**A**).



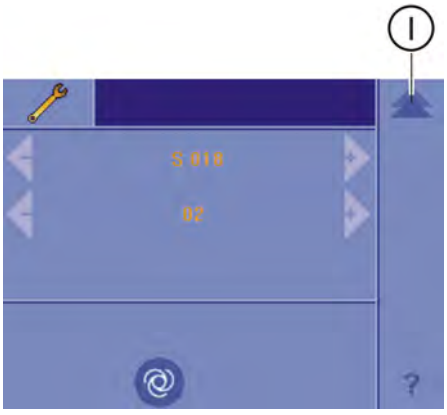
2. To select **level 3** (*"Select basic settings"*), touch the left-hand blue arrow in the top right corner of the touchscreen (**B**).



3. To select **level 4** (service menu/access), touch the wrench symbol (**C**).

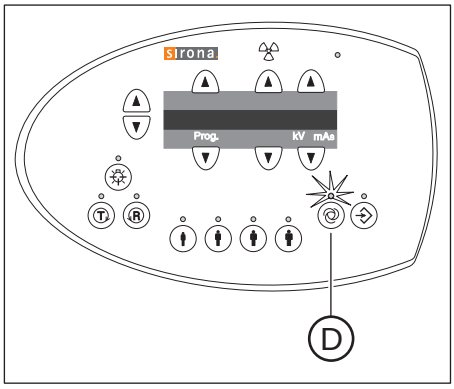


4. Switch to the service menu:
Press and hold down the Service key (**D**) until the patient symbol keys light up (**E-H**) (approx. 2 s). Then press the patient symbol keys in the sequence **F** – **H** – **E** within the next 4 s.

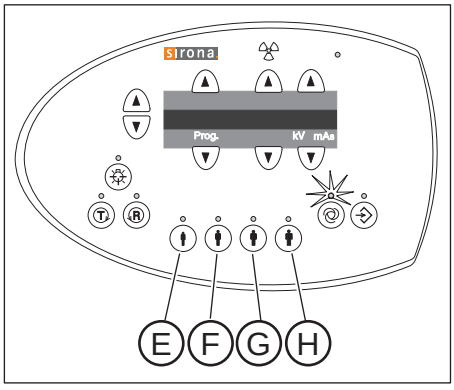


↳ After you have entered the key combination correctly, the service menu is displayed. You can return to the next higher level with the double arrow key (**I**) at any time.

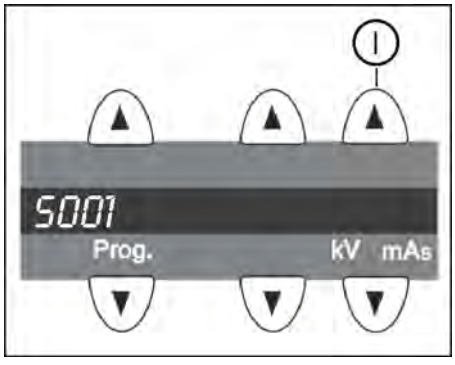
8.3.1.2 Multipad



1. Press and hold down Service key (**D**) until the patient symbol keys light up (**E-H**) (approx. 2 s).



2. Then press the patient symbol keys in the sequence **F** – **H** – **E** within the next 4 s.

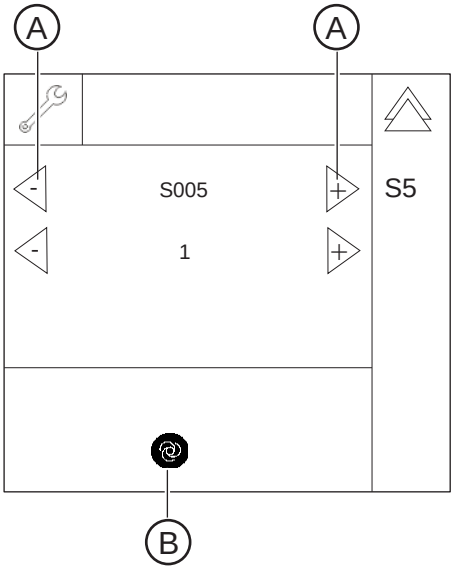


↳ After you have entered the key combination correctly, the service menu is displayed. You can return to the next higher level with the arrow key above selection field 3 (**I**) at any time.

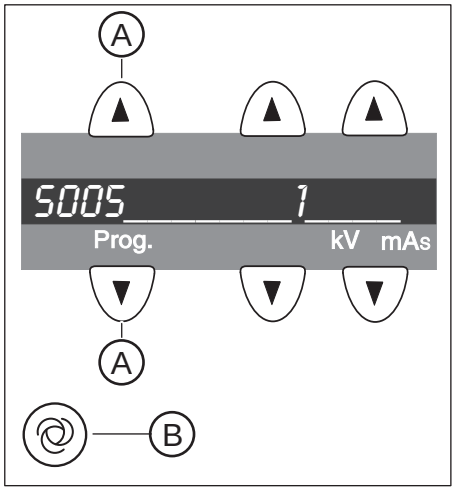
8.3.2 Selecting service routines and test steps

8.3.2.1 Selecting a service routine

✓ The service menu must be selected [→ 180].



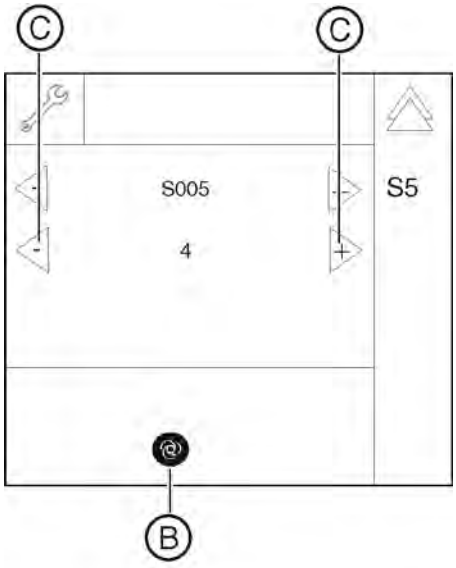
➢ Select the desired service routine via the arrow keys in the selection field 1 (**A**) and confirm the selection via the service key (**B**).
If the selected service routine has several test steps, the first selectable test step is displayed in selection field 2 (test step 1 in the example).



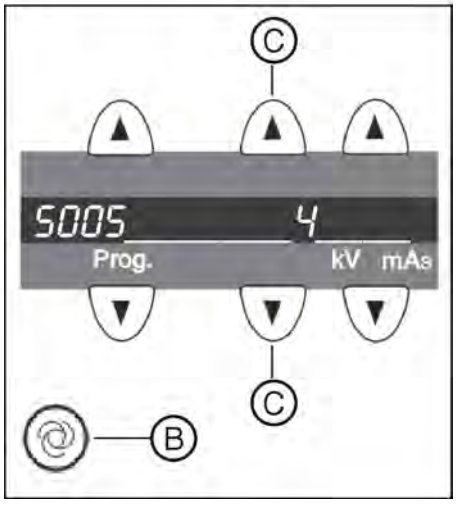
8.3.2.2 Selecting a test step

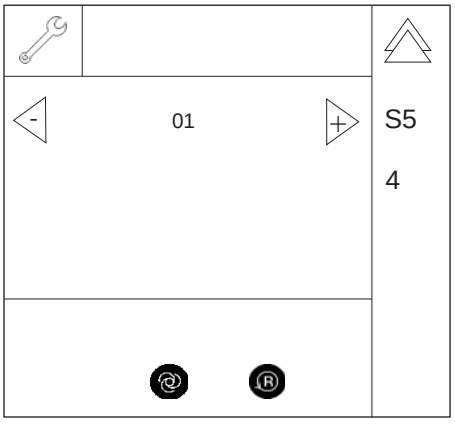
✓ The service menu must be selected [→ 180].

✓ The required service routine must be selected [→ 182].

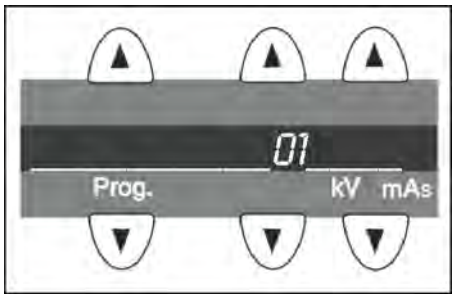


➢ Select the required test step in selection field 2 with arrow keys (**C**) and confirm your selection by pressing Service key (**B**).





↳ *Easypad:* The selected service routine as well as the test step chosen are displayed in the right-hand column (S005.4 in the example).



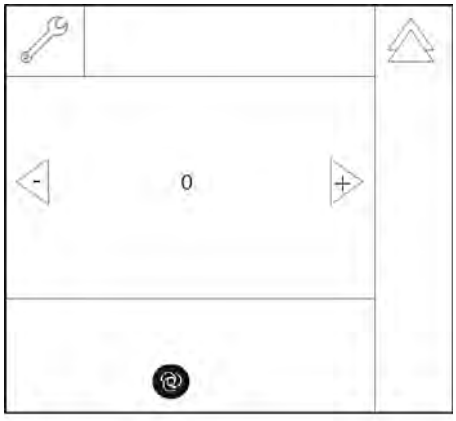
↳ *Multipad:* The parameters or IDs of the selected service routine are displayed on the Multipad. The Multipad does not show which service routine or test step is currently active.

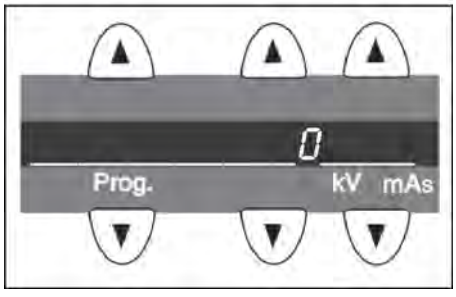
8.3.2.3 Service routines with security access

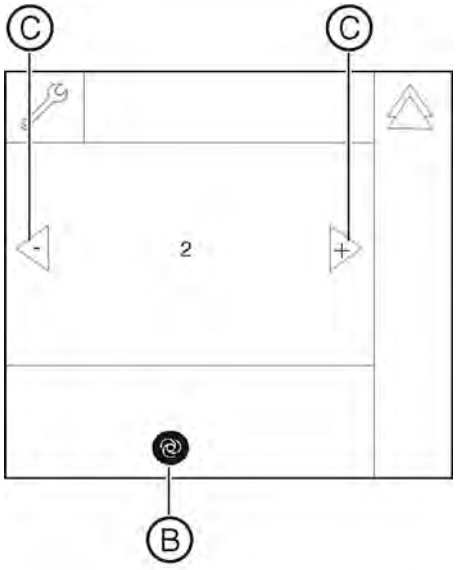
A security code is required for accessing service routines involving functions such as radiation release or editing of configuration data or stored values. This procedure prevents the inadvertent selection or activation of these service routines.

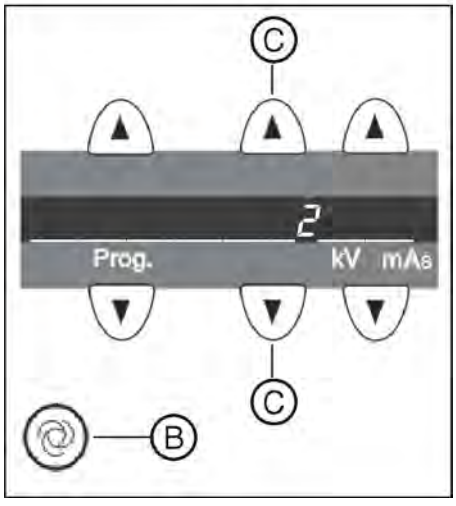
To select a service routine or test step with security access, proceed as follows:

1. Select the service routine or the test step, and confirm your selection with the Service key [→ 182].
   ↳ After you have confirmed your selection, a "0" appears in selection field 2.

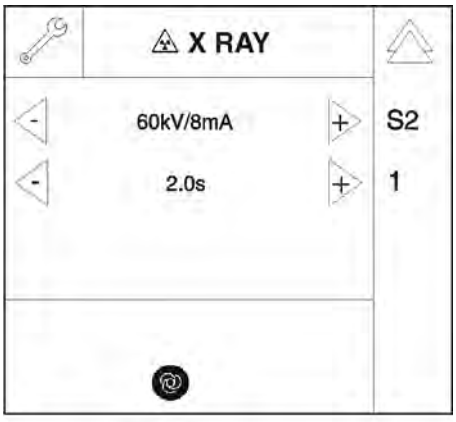


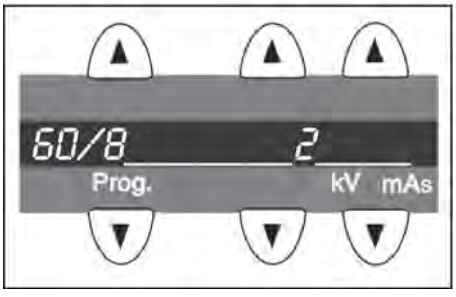






2. Confirm security access by once again selecting the number of the main routine (2 in the example) with the arrow keys in selection field 2 (**C**) and press the Service key (**B**) to confirm your selection.





↳ Following this double selection and confirmation via the Service key, the service routine is activated.

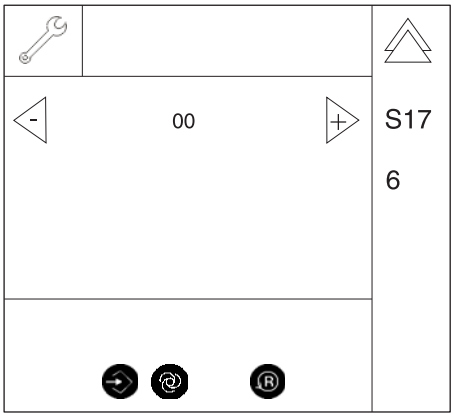
8.3.3 Select parameters

Easypad touchscreen

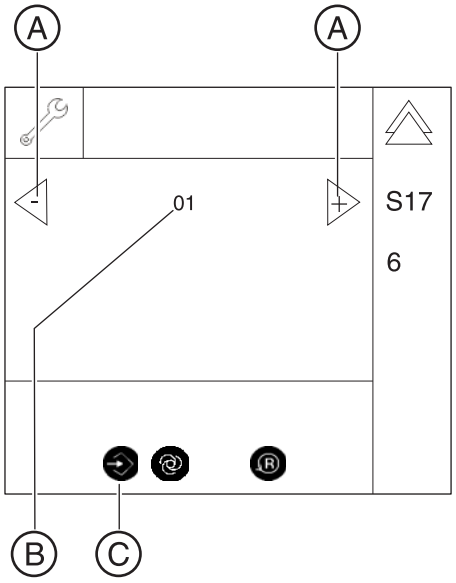
If arrow keys are displayed in the selection fields once the required service routine has been selected, you can use these arrow keys to choose between different parameters.

Example

You want to run service routine S017.6 to activate the remote control.



✓ Once you have selected service routine S017.6, the code "00" is pre-selected for the "Remote control disabled" option.



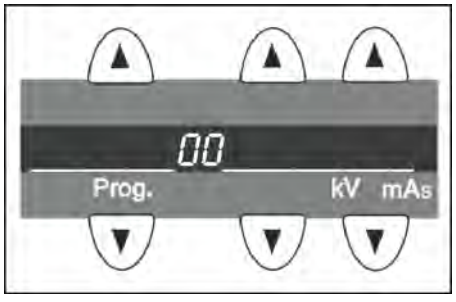
➢ Touch the + or - arrow keys (**A**) to select the code 01 (**B**) for the "Remote control enabled" option.

↳ Once the selected parameter has been changed (in this case the code for the activation of the remote control), the Memory key (**C**) lights up.

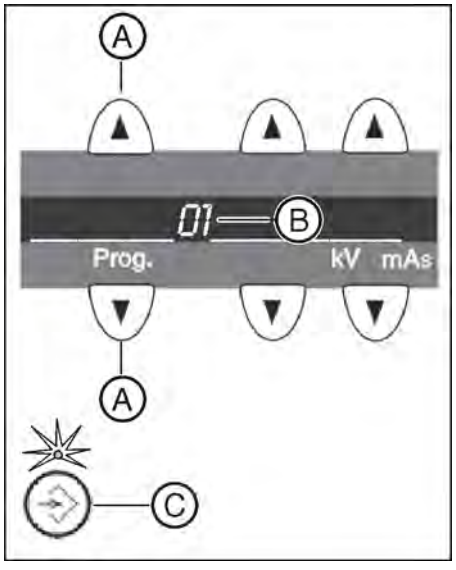
Multipad

Example

You want to run service routine S017.6 to activate the remote control.



✓ Once you have selected service routine S017.6, the code "00" is pre-selected for the "Remote control disabled" option.



➢ Press the UP or DOWN arrow key (**A**) to select the code 01 (**B**) for the "Remote control enabled" option.

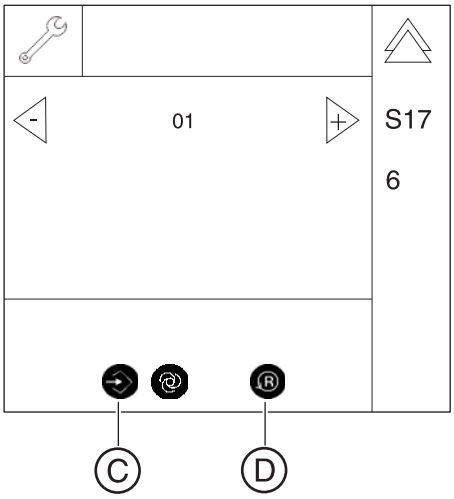
↳ Once the selected parameter has been changed (in this case the code for the activation of the remote control), the LED above Memory key (**C**) lights up.

8.3.4 Saving parameters

Once one or a number of parameters have been selected via a service routine, the current selection must be saved so that it is applied in the unit.

Easypad touchscreen

Example



You want to run service routine S017.6 to save the selected option "Remote control enabled".

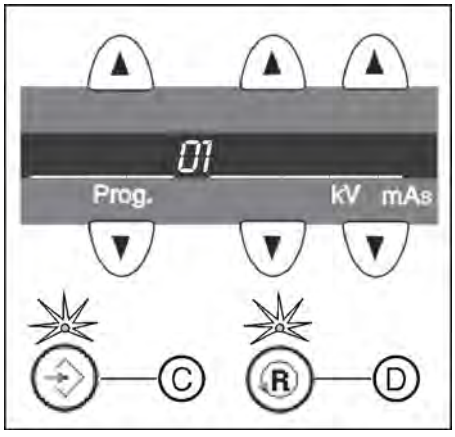
✓ The Memory key (**C**) lights up.

1. Touch the Memory key (**C**).
   ↳ The R key (**D**) lights up.
2. Touch the R key (**D**).

↳ The selected setting is saved to non-volatile memory.

Multipad

Example



You want to run service routine S017.6 to save the selected option "Remote control enabled".

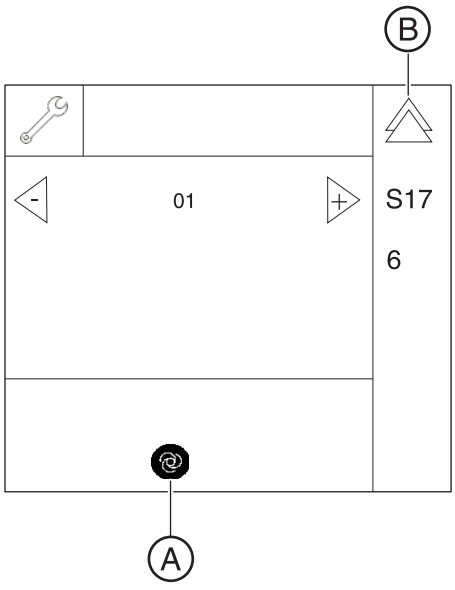
✓ The LED above Memory key (**C**) lights up.

1. Press Memory key (**C**).
   ↳ The LED above the R key lights up.
2. Press R key (**D**).

↳ The selected setting is saved to non-volatile memory.

8.3.5 Exiting the test step and service routine

Easypad



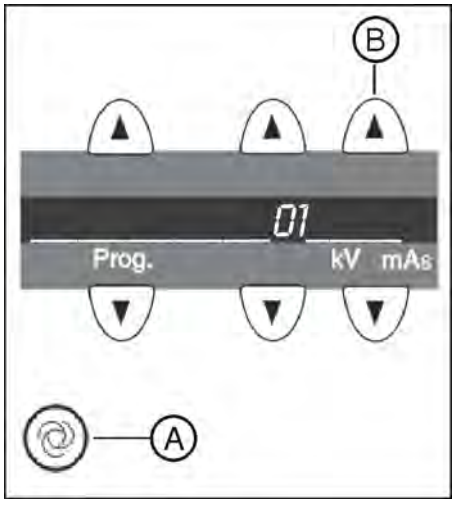
Touch the Service key (**A**) or the double arrow key (**B**) to go back to the menu for selecting service routines.

Touch the double arrow key (**B**) in the service menu to go back to the main menu.

Exception: Service routine S017

In service menu S017, touch the Service key (**A**) to go to the next test step in the service routine.

Multipad



Press the Service key (**A**) or the up arrow key above selection field 3 (**B**) to go back to the menu for selecting service routines.

In the service menu, touch the up arrow key above selection field 3 (**B**) to go back to the main menu.

Exception: Service routine S017

In service menu S017, press the Service key (**A**) to go to the next test step in the service routine.

8.4 S002: Radiation without rotary movement, selectable kV/mA level and maximum radiation time

SR*	SHZ**	Function
S002		X-ray beam test
S002.5	Yes	Long-term exposure with fixed radiation intervals from any position

* SR=service routine, ** SHZ=security access

8.4.1 S002: Test step 5

Long-term exposure with fixed radiation intervals from any position

⚠ WARNING

Unit is radiating X-rays

Excess exposure to X-rays is detrimental to health.

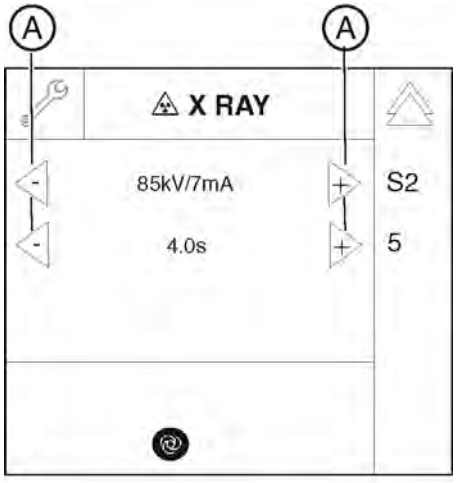
➢ Use the prescribed accessories for radiation protection.

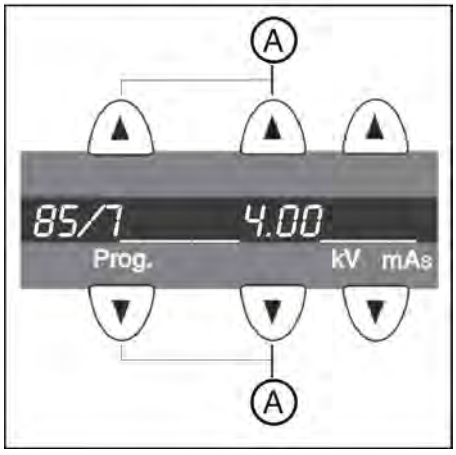
➢ Do not stay in the X-ray room during exposure. Move as far away from the unit as the coiled cable for the release button allows you to.

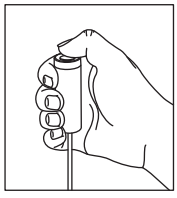
Selection field	Parameters	Range of values
1	kV/mA level	85kV/5mA 85 kV / 7 mA*
2	Radiation time	0.1 s – 4 s*

* Factory setting

1. Call service routine S002.5 [→ 182].







2. Use the arrow keys (**A**) to select the required kV/mA level and the required radiation time (see table).

3. Initiate the radiation.
   ↳ The maximum set radiation time has elapsed.
   IMPORTANT: If you let go of the release button before the maximum radiation time has elapsed, radiation is terminated prematurely and the exposure is interrupted. The actual radiation time is *not* displayed.
   When you release radiation during the cool-down interval, a countdown of the remaining waiting time is displayed in the header of the control panel or in selection field 2 on the Multipad (automatic exposure blocking).

4. Exit the service routine [→ 190].

8.5 S005: General X-ray tube assembly service

SR*	SA**	Function
S005		General X-ray tube assembly service
S005.4	No	Fan test
S005.5	No	Temperature sensor test, single tank
S005.8	Yes	Automatic adjustment of pulse preheating

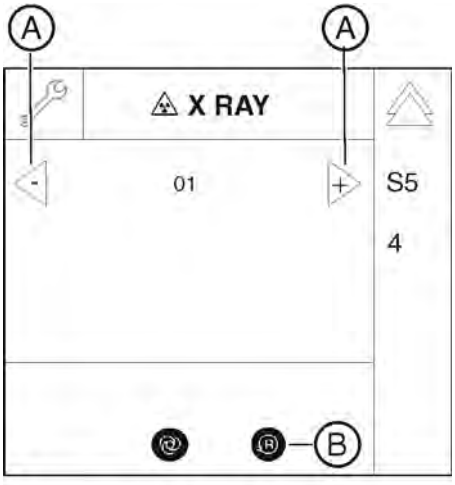
* SR=service routine, ** SA=security access

8.5.1 S005: Test step 4

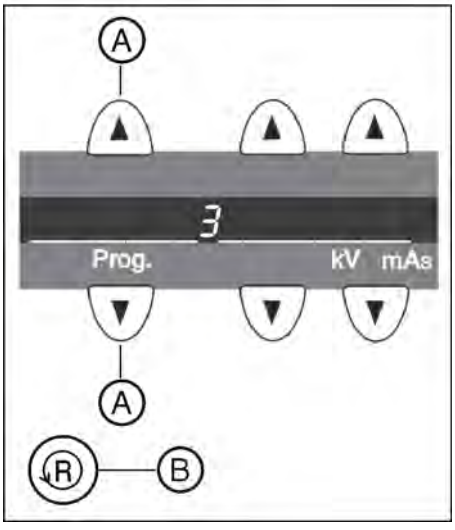
Fan test

Selection field	Code	Function
1	00	Fan off*
	01	Fan on

* Factory setting



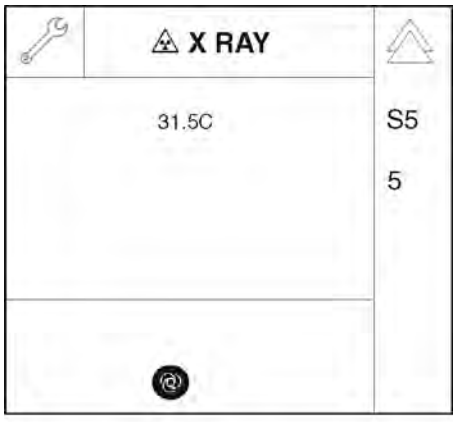
1. Call service routine S005.4 [→ 182].
2. Use the arrow keys (**A**) in selection field 1 to select the code "01" (see table).
3. Confirm your selection by pressing the R key (**B**).
   ↳ The fan starts up.
4. Check the fan for running noise.
5. Exit the service routine [→ 190].
   Upon exiting the service routine, the fan is automatically switched off again.

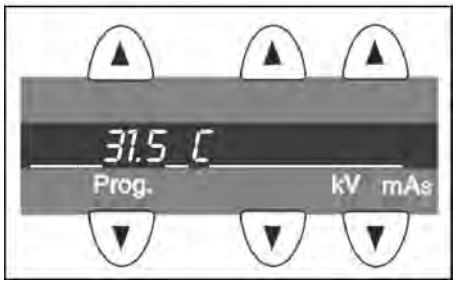


8.5.2 S005: Test step 5

Temperature sensor test, single tank

1. Call service routine S005.5 [→ 182].





↳ After the service routine has been selected, selection field 1 displays the single tank temperature in °C. The display is updated once per second.

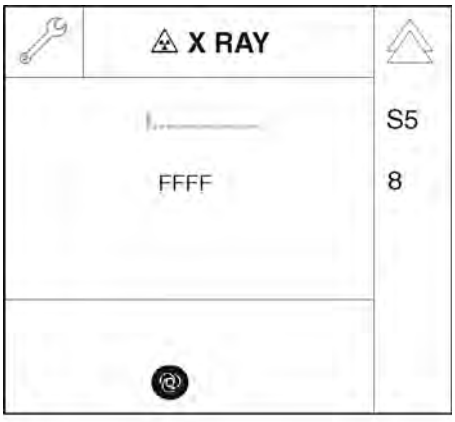
2. Exit the service routine [→ 190].

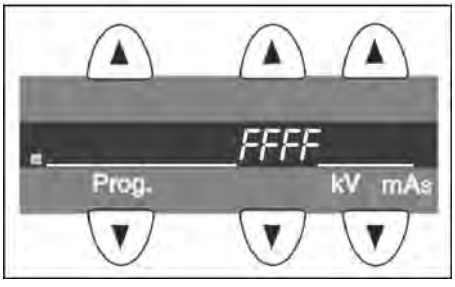
8.5.3 S005: Test step 8

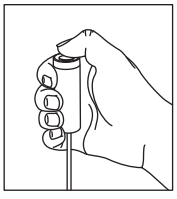
IMPORTANT
After performing this service routine, the unit must be completely recalibrated.

Automatic adjustment of pulse preheating

1. Call service routine S005.8 [→ 182].

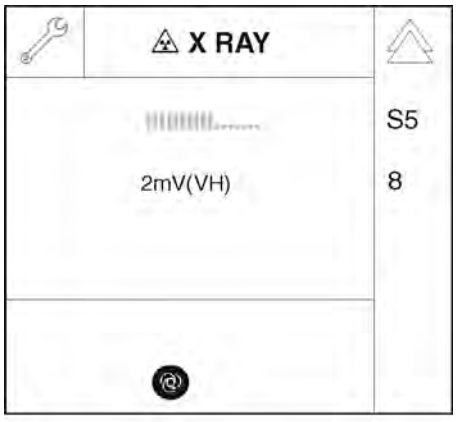


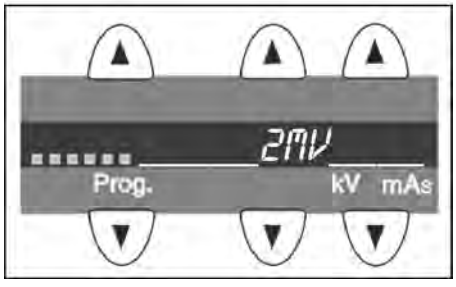




- An inactive progress indicator in selection field 1 and the message "FFFF" in selection field 2 signal that the system is ready for compensation.

2. Start the automatic adjustment by pressing and holding the release button.
   IMPORTANT: Keep pressing the release button until adjustment is completed and the new offset value for preheating is displayed. If you interrupt the adjustment procedure prematurely by letting go of the release button, the message "EEEE" appears in selection field 2. This message must be acknowledged by pressing the R key.
   - When pressing the release button, radiation is released for 2 s to warm up the tube assembly to operating temperature. This is followed by the automatic tuning routine.





↳ A progress indicator is displayed during the service function.

3. After the adjustment has been performed, exit the service routine [→ 190].

8.6 S007: Error logging memory

SR*	SHZ**	Function
S007		Error logging memory
S007.1	No	Display error logging memory
S007.2	Yes	Clearing error logging memory
S007.5	No	Enabling CAN bus logging in the web interface

* SR=service routine, ** SHZ=security access

8.6.1 S007: Test step 1

Display error logging memory

In addition to service routine S007.1, you can also use the extended detail query in SiXABCon to check the error logging memory.

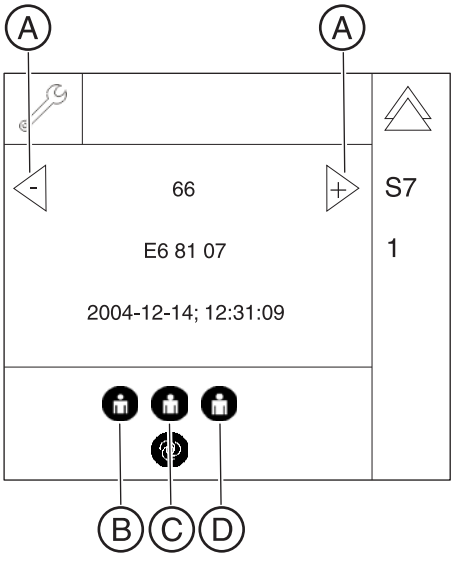
Easypad touchscreen

Symbol on the control panel	Status	Function
Patient symbol key 1 (**B**)	is selected	Step width for scrolling between error events = 1*
Patient symbol key 2 (**C**)	is selected	Step width for scrolling between error events = 10
Patient symbol key 3 (**D**)	is selected	Step width for scrolling between error events = 100

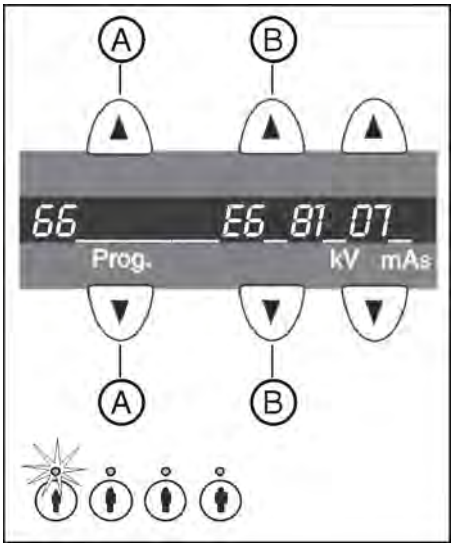
Selection field	Selection/display
1	Error event
2	Error code for the selected event
3	Date and time of the selected error event

* Factory setting

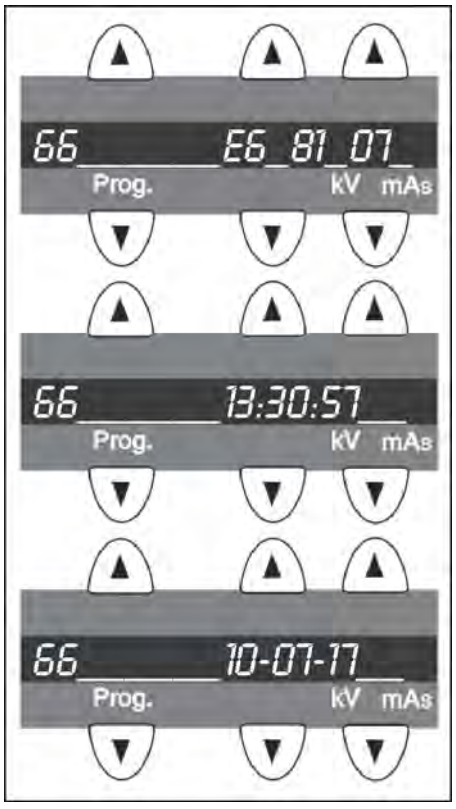
1. Call service routine S007.1 [→ 182].
2. Use the patient symbol keys (**B**, **C**, **D**) to select the step width for scrolling between the error events (see table).
   - The selected patient symbol key lights up.
3. Use the arrow keys (**A**) in selection field 1 to select the required error event (66 in the example).
   - The corresponding error message is displayed in selection field 2 [→ 77].
   - Selection field 3 displays the date and time of the error event.
4. Exit the service routine [→ 190].



Multipad



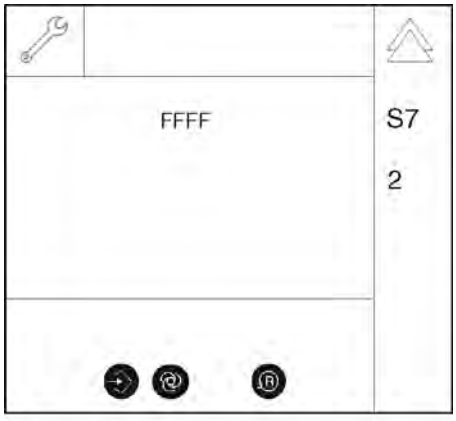
1. Call service routine S007.1 [→ 182].
2. Use the arrow keys (**A**) in selection field 1 to select the required error event (66 in the example).
   Use the patient symbol keys to set the increment for scrolling between the error numbers:
   Patient symbol key 1 (left) = increment 1 (factory setting)
   Patient symbol key 2 = increment 10
   Patient symbol key 3 = increment 100
   The LED above the selected patient symbol key is lit up.



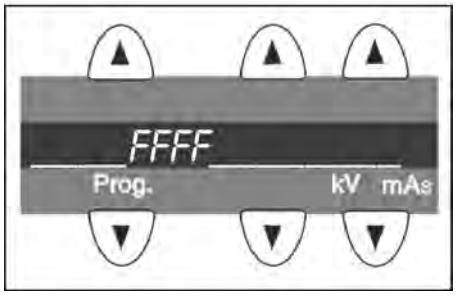
3. Use the arrow keys (**B**) to scroll and display the corresponding error code [→ 77], the time, and the date of the error event in selection field 2.
4. Exit the service routine [→ 190].

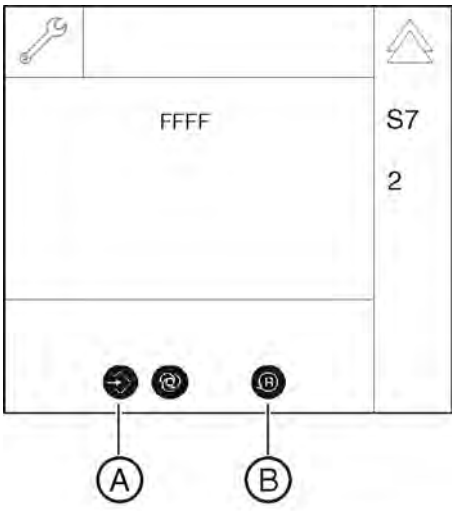
8.6.2 S007: Test step 2

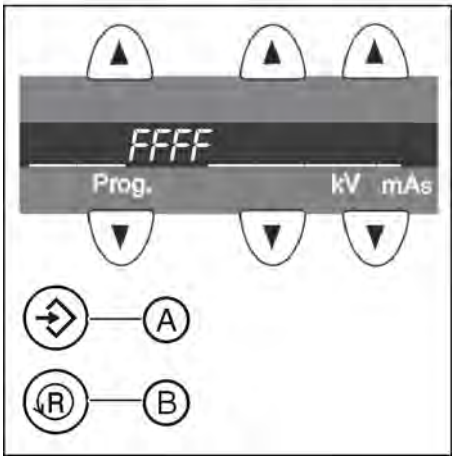
Clearing error logging memory



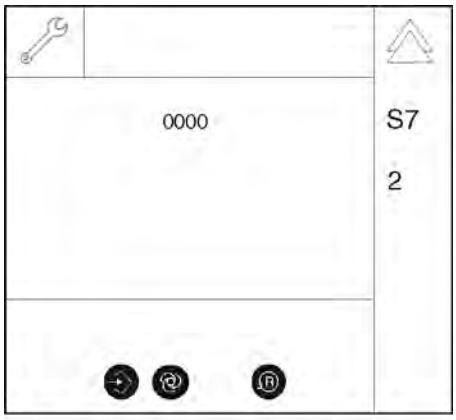
1. Call service routine S007.2 [→ 182].
   ↳ The system's readiness to clear the memory is indicated by the display message "FFFF" in selection field 1. If the error logging memory does not contain any data, "0000" is displayed.

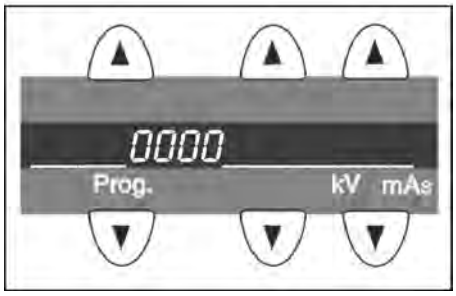






2. To clear the memory, press the Memory key (**A**) (R key (**B**) (Easypad) or LED above the R key (**B**) (Multipad) lights up) followed by the R key (**B**).





↳ Once the memory has been cleared, the message "0000" is displayed in selection field 1.

3. Exit the service routine [→ 190].

8.6.3 S007: Test step 5

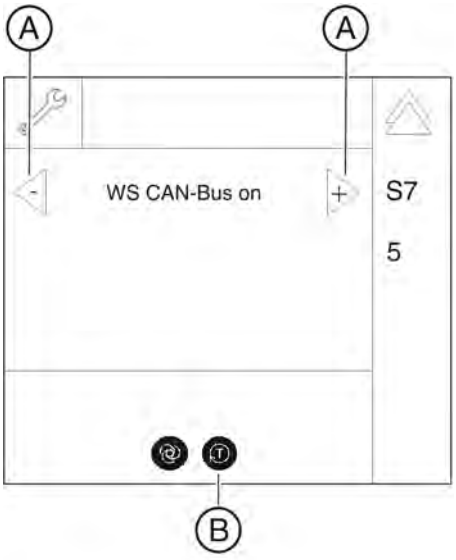
Enabling CAN bus logging in the web interface

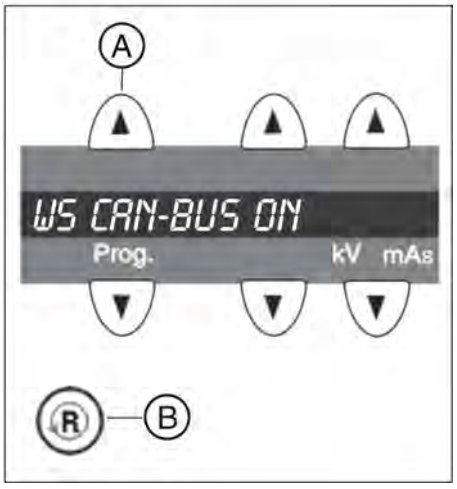
NOTICE
This service routine may only be called up subject to the approval of and with the support of the Sirona Customer Service Center (CSC).

Selection field	Parameters	Function
1	WS CAN bus off	Logging off*
	WS CAN bus on	Logging on
	WS CAN bus ex. on	Extended logging on

* Factory setting

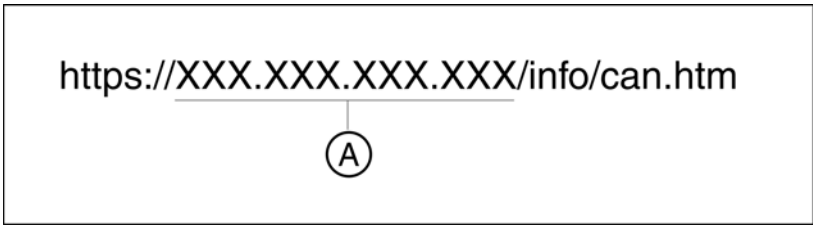
1. Call service routine S007.5 [→ 182].



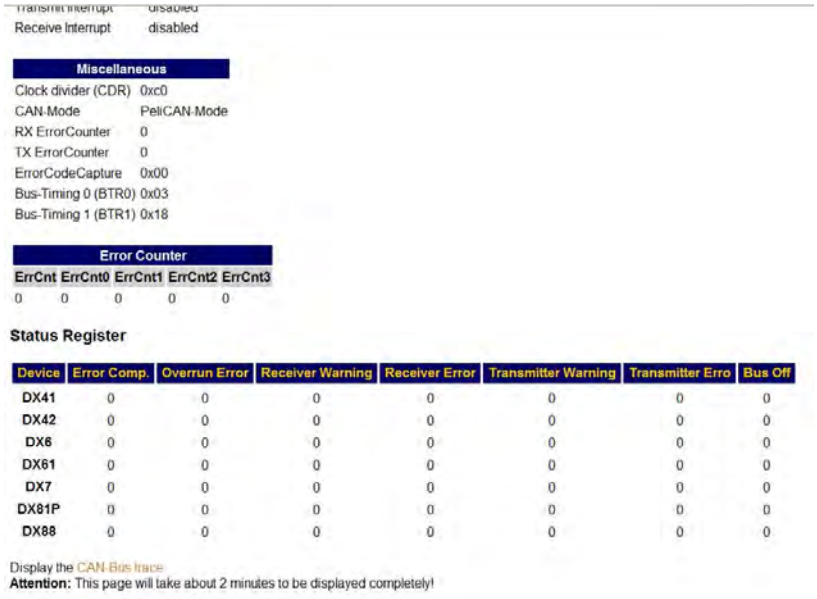


2. Use the arrow keys (**A**) to select the required setting (see table).
   ↳ Once the required setting has been selected, the T key (**B**) (Easypad) or the LED above the T key (**B**) (Multipad) lights up.
3. Touch the T key (**B**) to enable the selected setting.
   ↳ All CAN bus events occurring from now on during operation of the unit will be logged and can be displayed with a web browser (e.g. Internet Explorer). This log will help you when consulting the Sirona Customer Service Center (CSC) for error diagnosis.
4. Exit the service routine [→ 190].

8.6.3.1 Displaying the log with a web browser



1. Enter the following web address on a PC (with internet access) integrated in a system network:
   A: IP address of the unit



Transmit Interrupt disabled
Receive Interrupt disabled

Miscellaneous

Clock divider (CDR)	0xc0
CAN-Mode	PeliCAN-Mode
RX ErrorCounter	0
TX ErrorCounter	0
ErrorCodeCapture	0x00
Bus-Timing 0 (BTR0)	0x03
Bus-Timing 1 (BTR1)	0x18

Error Counter

ErrCnt	ErrCnt0	ErrCnt1	ErrCnt2	ErrCnt3
0	0	0	0	0

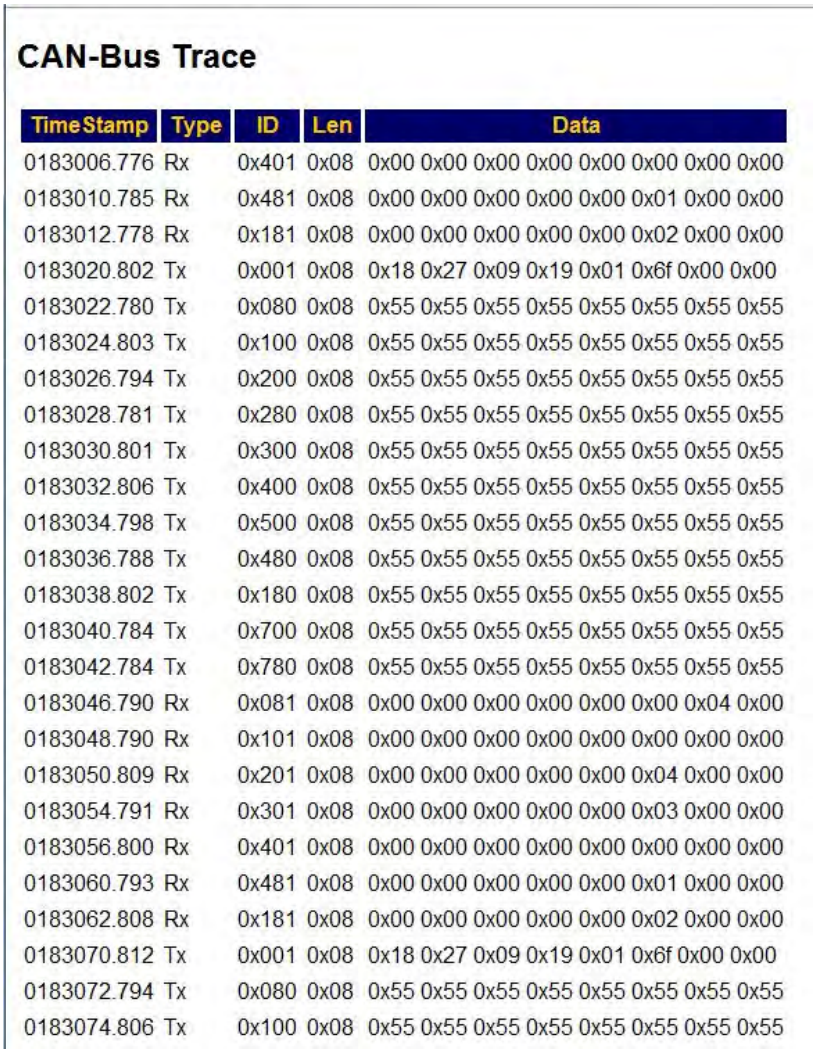
Status Register

Device	Error Comp.	Overrun Error	Receiver Warning	Receiver Error	Transmitter Warning	Transmitter Erro	Bus Off
DX41	0	0	0	0	0	0	0
DX42	0	0	0	0	0	0	0
DX6	0	0	0	0	0	0	0
DX61	0	0	0	0	0	0	0
DX7	0	0	0	0	0	0	0
DX81P	0	0	0	0	0	0	0
DX88	0	0	0	0	0	0	0

Display the CAN-Bus trace
Attention: This page will take about 2 minutes to be displayed completely!

↳ The CAN bus browser opens.

2. In the lower area, select the "CAN bus" link.



CAN-Bus Trace

TimeStamp	Type	ID	Len	Data
0183006.776	Rx	0x401	0x08	0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0183010.785	Rx	0x481	0x08	0x00 0x00 0x00 0x00 0x00 0x01 0x00 0x00
0183012.778	Rx	0x181	0x08	0x00 0x00 0x00 0x00 0x00 0x02 0x00 0x00
0183020.802	Tx	0x001	0x08	0x18 0x27 0x09 0x19 0x01 0x6f 0x00 0x00
0183022.780	Tx	0x080	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183024.803	Tx	0x100	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183026.794	Tx	0x200	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183028.781	Tx	0x280	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183030.801	Tx	0x300	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183032.806	Tx	0x400	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183034.798	Tx	0x500	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183036.788	Tx	0x480	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183038.802	Tx	0x180	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183040.784	Tx	0x700	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183042.784	Tx	0x780	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183046.790	Rx	0x081	0x08	0x00 0x00 0x00 0x00 0x00 0x00 0x04 0x00
0183048.790	Rx	0x101	0x08	0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0183050.809	Rx	0x201	0x08	0x00 0x00 0x00 0x00 0x00 0x04 0x00 0x00
0183054.791	Rx	0x301	0x08	0x00 0x00 0x00 0x00 0x00 0x03 0x00 0x00
0183056.800	Rx	0x401	0x08	0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
0183060.793	Rx	0x481	0x08	0x00 0x00 0x00 0x00 0x00 0x01 0x00 0x00
0183062.808	Rx	0x181	0x08	0x00 0x00 0x00 0x00 0x00 0x02 0x00 0x00
0183070.812	Tx	0x001	0x08	0x18 0x27 0x09 0x19 0x01 0x6f 0x00 0x00
0183072.794	Tx	0x080	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55
0183074.806	Tx	0x100	0x08	0x55 0x55 0x55 0x55 0x55 0x55 0x55 0x55

↳ The CAN bus protocol is displayed in the browser and can be saved as an HTML page, printed out, or sent to the Sirona Customer Service Center (CSC).

8.7 S008: Update service

SR*	SHZ**	Function
S008		Checking the software versions
S008.2	No	Overview of the module software versions
S008.3	No	Input/confirm/query unit serial number

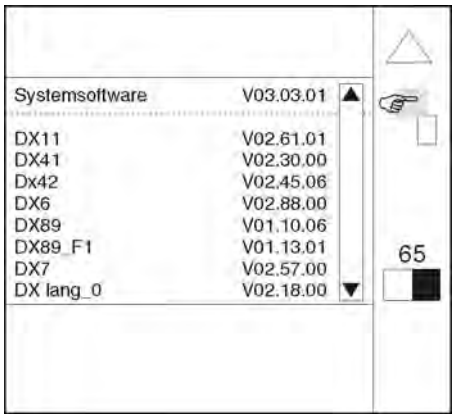
* SR=service routine, ** SHZ=security access

8.7.1 S008: Test step 2

Overview of module software versions

Easypad touchscreen

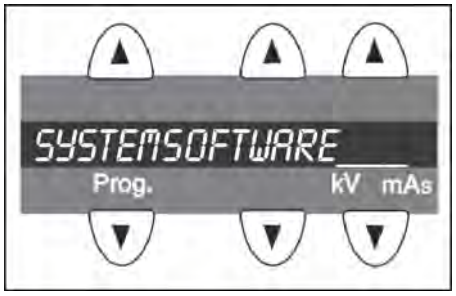
1. Call service routine S008.2 [→ 182].



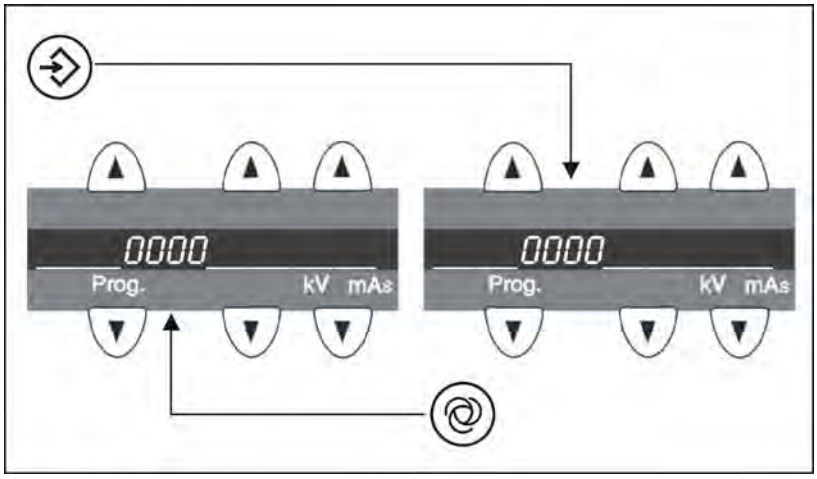
↳ The software versions currently installed on the modules are displayed on an info screen on the touchscreen display.

2. Exit the service routine [→ 190].

Multipad



1. Call service routine S008.2 [→ 182].
   ↳ "SYSTEMSOFTWARE" is displayed on the display line of the Multipad.
2. Select the required module in selection field 1 with the arrow keys (**A**) and confirm your selection by pressing the Memory key (**B**).



↳ The software version of the selected module is displayed in selection field 1.

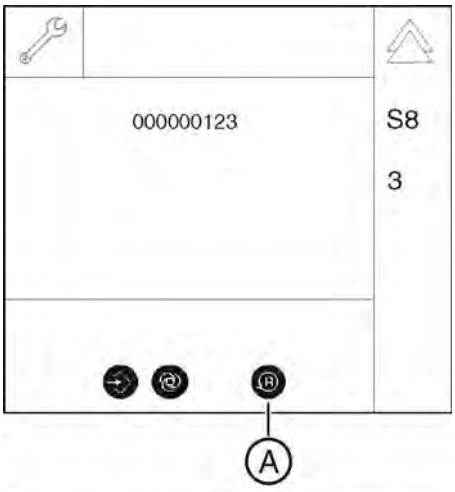
3. Exit the service routine [→ 190].

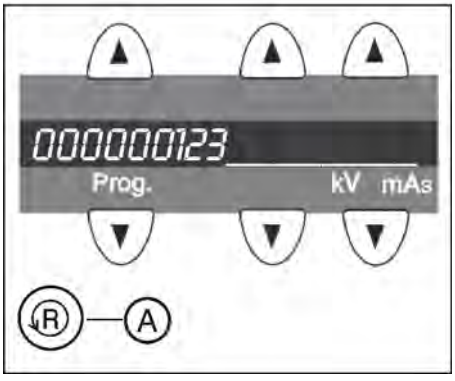
8.7.2 S008: Test step 3

Confirming the unit serial number

IMPORTANT
If the backup copy of the old unit serial number does not match the new one after replacing a module, the entry of the serial number is activated. If an incorrect serial number is entered, the message "FFFF" appears on the display. In this case, the service routine can be run again.

1. Call service routine S008.3 [→ 182].





2. Confirm the serial number displayed by pressing the R key (**A**).
3. Exit the service routine [→ 190].

8.8 S009: Flash file system

IMPORTANT
The unit has to be completely recalibrated after formatting the flash file system [→ 145]. When the flash file system is formatted, the content of the error logging memory is lost.

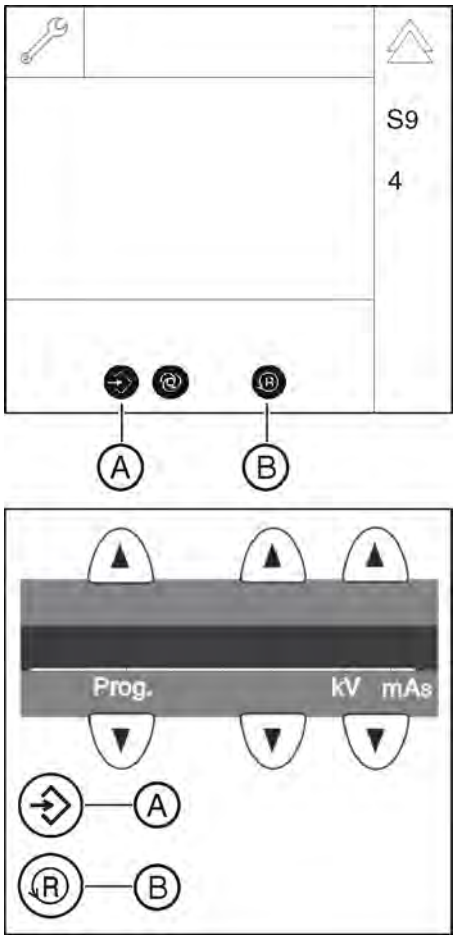
SR*	SHZ**	Function
S009		Flash file system
S009.4	Yes	Initializing the flash file system
S009.5	No	Test flash file system
S009.7	Yes	Save/restore DX89 data

* SR=service routine, ** SHZ=security access

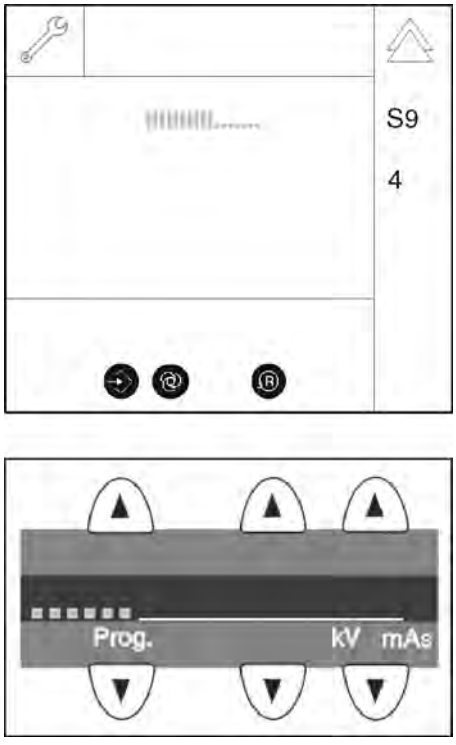
8.8.1 S009: Test step 4

Formatting flash file system

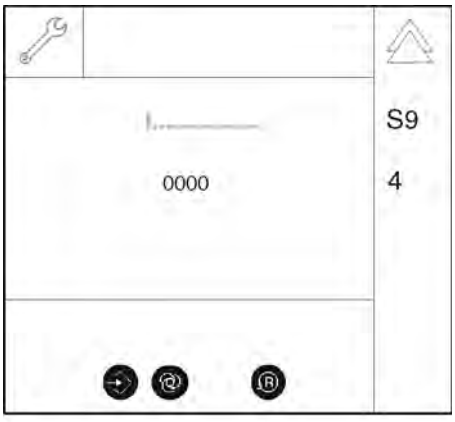
1. Call service routine S009.4 [→ 182].

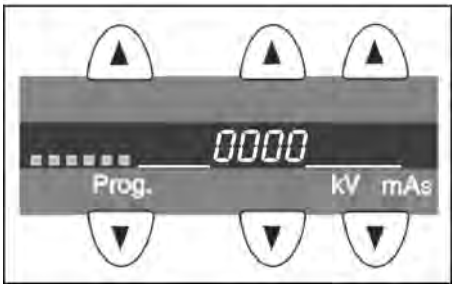


2. To initialize the flash file system, press the Memory key (**A**) (R key (Easypad) or LED above R key (Multipad) lights up) followed by the R key (**B**).



↳ Flash file system formatting in progress. This process takes approx. 5-6 mins and is visualized by a progress indicator.





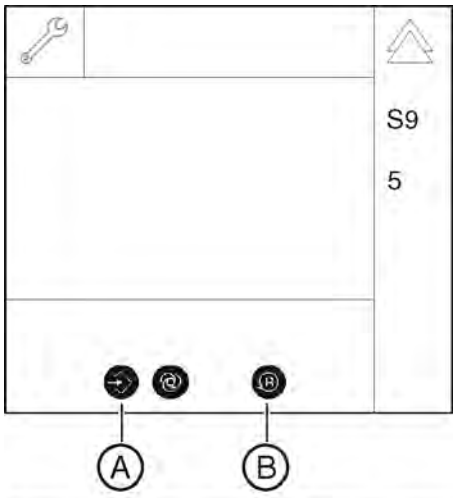
↳ The end of this process is indicated by the message "0000" in selection field 2.

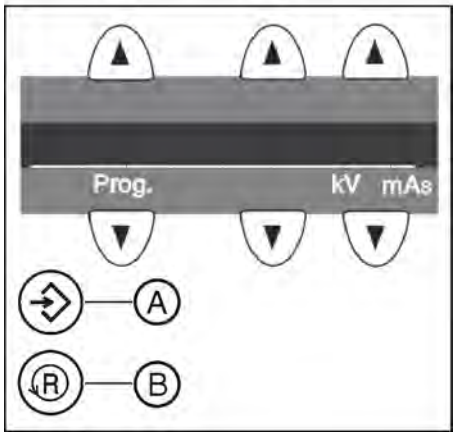
3. Exit the service routine [→ 190].

8.8.2 S009: Test step 5

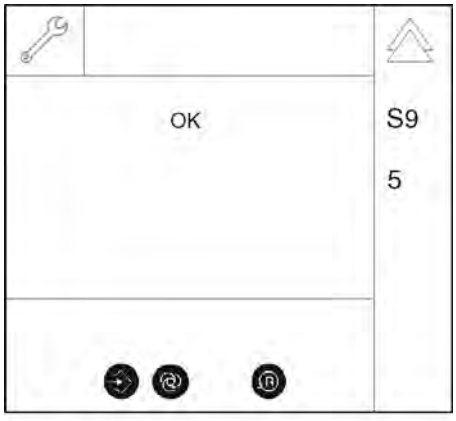
Test flash file system

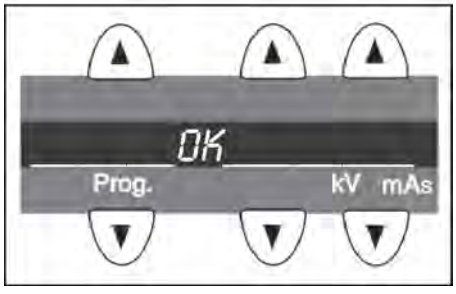
1. Call service routine S009.5 [→ 182].





2. To test the flash file system, press the Memory key (**A**) (R key (Easypad) or LED above R key (Multipad) lights up) followed by the R key (**B**).

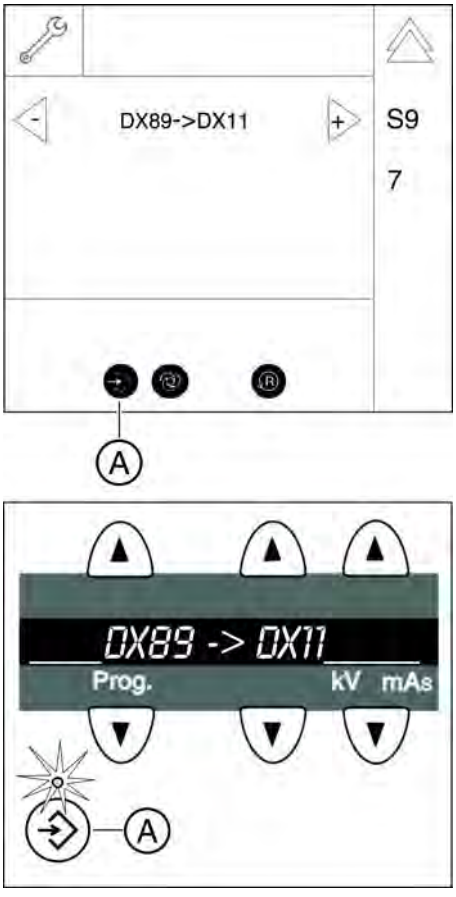




   - Once the system has passed the test without errors, "OK" appears in selection field 1.
   - If the test fails, "ERROR" is displayed. In this case, the flash file system must be formatted with service routine S009.4 [→ 205].

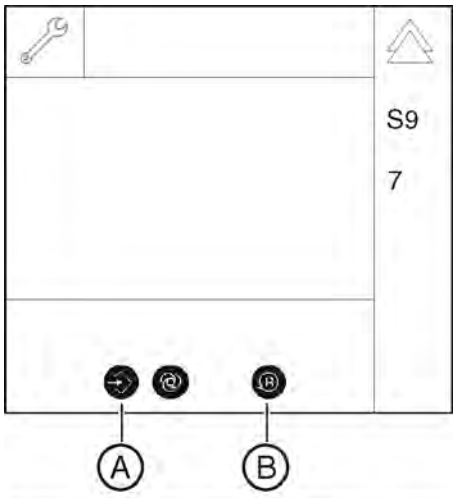
3. Exit the service routine [→ 190].

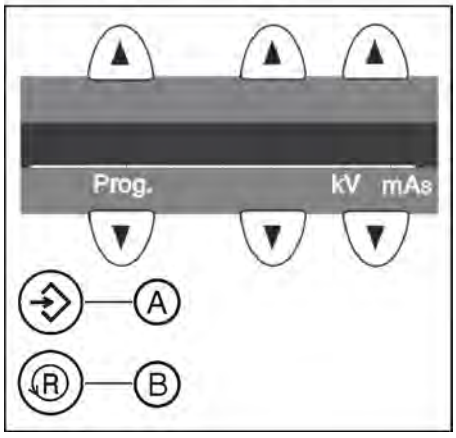
8.8.3 S009: Test step 7



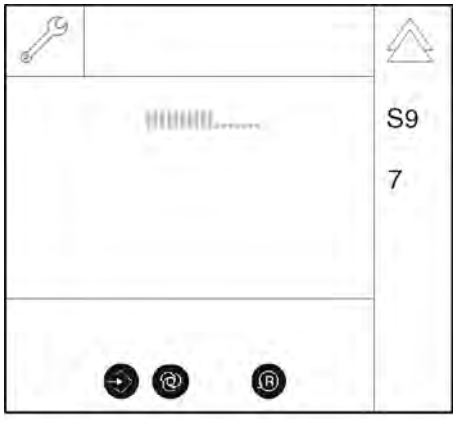
Save/restore DX89 data

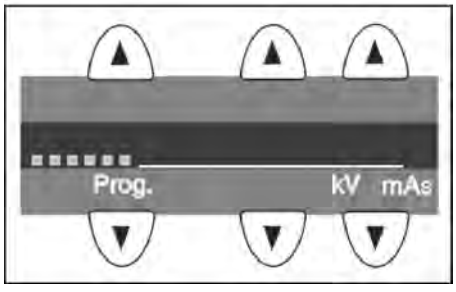
1. Call service routine S009.7 [→ 182].
   - After you select this service routine, the following can be displayed in selection field 1:
     DX89 ⇒ DX11:
     Data is transferred from DX89 to DX11, memory key (**A**) (Easypad) or LED above the memory key (**A**) (Multipad) is lit up.
     DX11 ⇒ DX89:
     Data is transferred from DX11 to DX89, memory key (**A**) (Easypad) or LED above the memory key (**A**) (Multipad) is lit up.
     "---":
     Data on both boards (DX11 and DX89) is valid or the data transfer is not possible, all keys (Easypad) or LEDs (Multipad) are not lit.
     Only one practical direction of data transfer is offered at any one time. If both locations contain valid data,
     "---" is displayed.





2. To trigger the memory process, press the Memory key (**A**) (R key (**B**) (Easypad) or LED above the R key (**B**) (Multipad) lights up) followed by the R key (**B**).





↳ The data are transferred. During the data transfer, a progress indicator is displayed in selection field 1.

3. Exit the service routine [→ 190].

8.9 S011: Dosimetry (without ring movement)

⚠ WARNING

Unit is radiating X-rays

Excess exposure to X-rays is detrimental to health.

➢ Use the prescribed accessories for radiation protection.

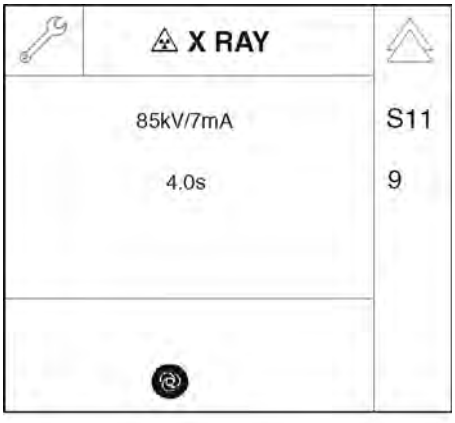
➢ Do not stay in the X-ray room during exposure. Move as far away from the unit as the coiled cable for the release button allows you to.

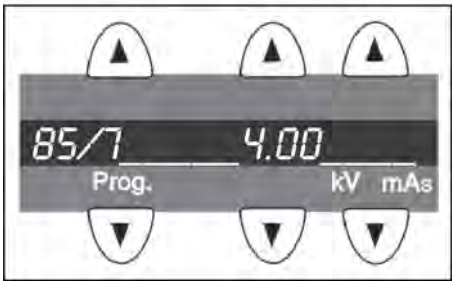
SR*	SA**	Function
S011		Dosimetry (without ring movement)
S011.9	Yes	*For the GALILEOS Compact and GALILEOS Comfort:* 4 s continuous radiation with 85 kV/7 mA (for current measurement)
		For the GALILEOS Comfort PLUS: 4 s continuous radiation with 98 kV/6 mA (for current measurement)
S011.12	Yes	Dosimetry with pulsed radiation

* SR=service routine, ** SA=security access

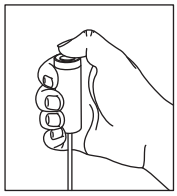
8.9.1 S011: Test step 9

Current measurement (unpulsed)





1. Call service routine S011.9 [→ 182].
   ↳ Selection field 1 displays the kVmA level, and selection field 2 displays the maximum radiation time.
   The kVmA level and the maximum radiation time are preset and cannot be changed:
   – GALILEOS Compact and GALILEOS Comfort: 85 kV/7 mA/4.0 s
   – GALILEOS Comfort^{PLUS}: 98 kV/6 mA/4.0 s

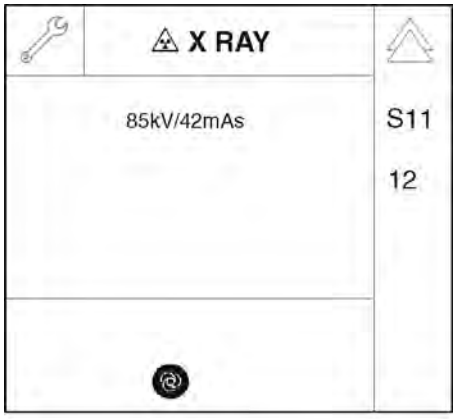


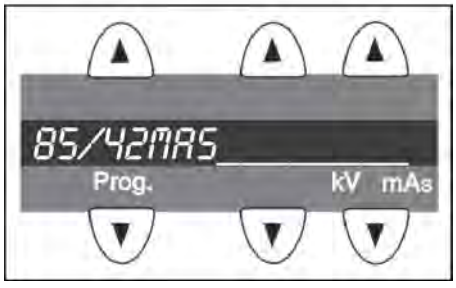
2. Initiate the radiation.
   ↳ The maximum set radiation time has elapsed.
   IMPORTANT: If you let go of the release button before the maximum radiation time has elapsed, radiation is terminated prematurely and the exposure is interrupted. The actual radiation time is *not* displayed.
   If you release radiation during the cool-down interval, a countdown of the remaining waiting time is displayed in the header of the Easypad or in selection field 2 on the Multipad (automatic exposure blocking).
3. Exit the service routine [→ 190].

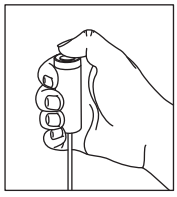
8.9.2 S011: Test step 12

Dosimetry with pulsed radiation

1. Call service routine S011.12 [→ 182].
   ↳ Selection field 1 displays the kVmA level:
   – GALILEOS Compact and GALILEOS Comfort: 85 kV/42 mAs
   – GALILEOS Comfort^{PLUS}: 98 kV/12 mAs







2. Initiate the radiation.
   ↳ Radiation uses 200 pulses and 85 kV/42 mAs or 98 kV/12 mAs.
   IMPORTANT: If you let go of the release button before the maximum radiation time has elapsed, radiation is terminated prematurely and the exposure is interrupted. The actual radiation time is *not* displayed.
   If you release radiation during the cool-down interval, a countdown of the remaining waiting time is displayed in the header of the Easypad or in selection field 2 on the Multipad (automatic exposure blocking).
3. Exit the service routine [→ 190].

8.10 S012: CAN bus service

SR*	SHZ**	Function
S012		CAN bus service
S012.1	No	Presence display of modules

* SR=service routine, ** SHZ=security access

IMPORTANT
The CAN bus service is not yet implemented for the module DX11!

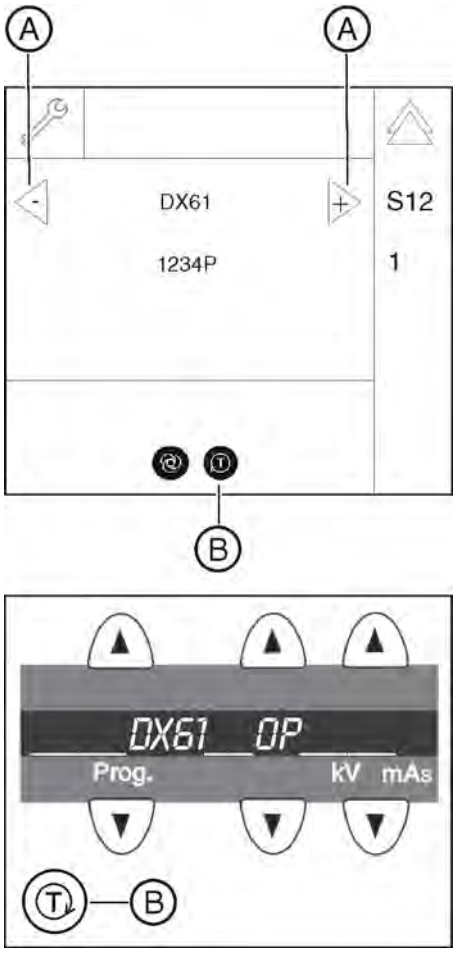
8.10.1 S012: Test step 1

Presence display of modules

Selection field	Parameter/Display	Range of values
1	Subassembly	DX1 - DX88
2	• Counter value of CAN bus events • Presence code behind the counter value: P = module present L = module lost	

➢ Call service routine S012.1 [→ 182].

Checking the module

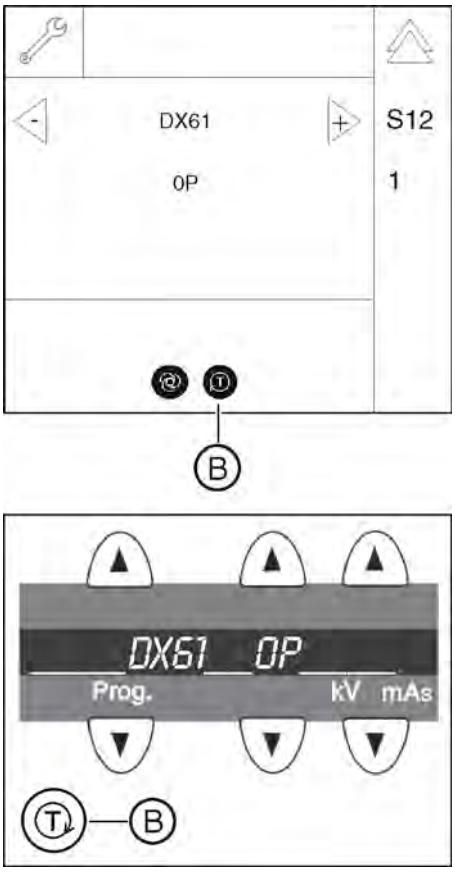


➢ Use the arrow keys (**A**) in selection field 1 to select the required module.

↳ The counter value of the CAN bus events processed so far (since the last switch-on of the unit) of the selected module is displayed in selection field 2 with the presence code of the module ("L" or "P") (see table).

↳ Once the module has been selected, the T key (**B**) (Easypad) or the LED above the T key (**B**) (Multipad) lights up.

Clearing the counter for the module

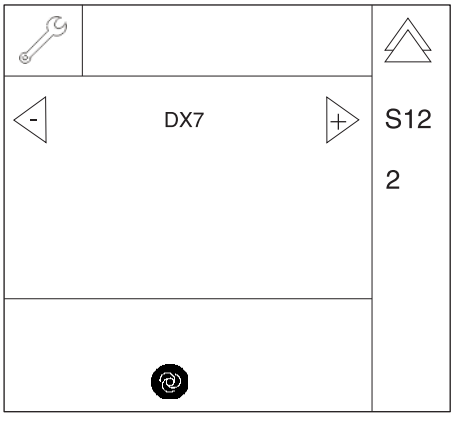


1. To delete the counter, press the T key (**B**).
   ↳ The counter is then reset to "0".
2. Exit the service routine [→ 190].

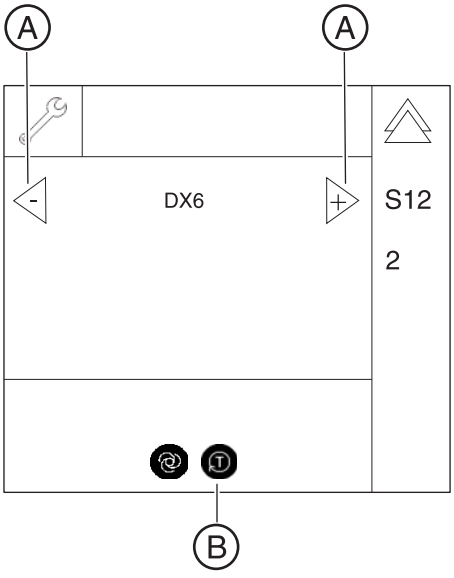
8.10.2 S012: Test step 2

Querying the CAN status register for the modules

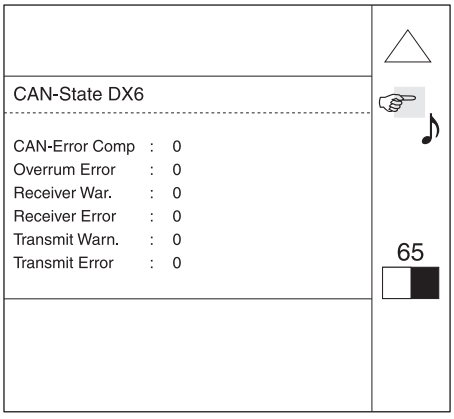
IMPORTANT
Before querying the CAN status register for the modules, you should first run service routine S012.3 to reset the registers [→ 216].



1. Call service routine S012.2 [→ 182].
   ↳ The currently selected module is displayed in selection field 1 (DX7 in the example).



2. Use the arrow keys (**A**) in selection field 1 to select the required module.
   ↳ Once the module has been selected, the T key (**B**) lights up.
3. Touch the T key (**B**).



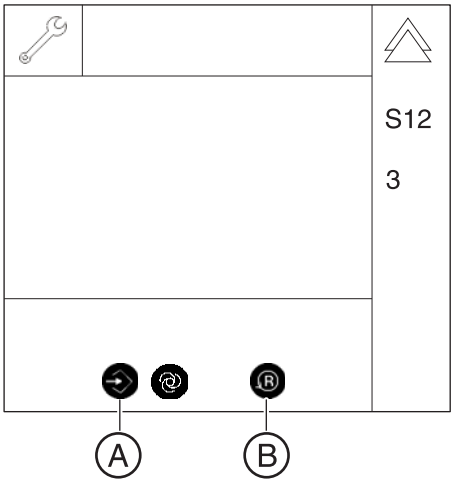
↳ The CAN status registers for the module called, e.g. *CAN-State DX6*, are displayed.
If values deviate from "zero", it points to a problematic CAN bus connection.

4. Exit the service routine [→ 190].

8.10.3 S012: Test step 3

Resetting the CAN status registers

IMPORTANT
Run this service routine as required before service routine S012.2.



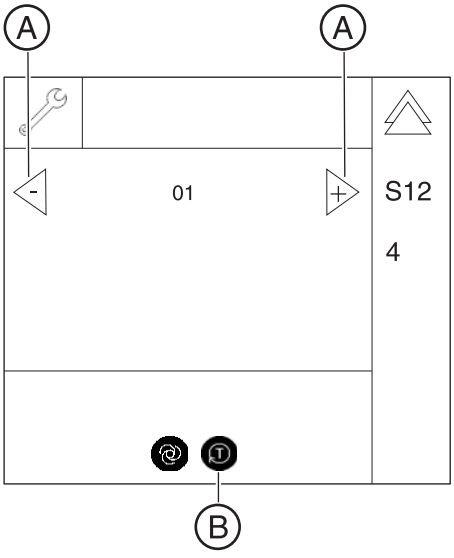
1. Call service routine S012.3 [→ 182].
   ↳ Once the service routine has been selected, the Memory key (**A**) lights up.
2. To delete the CAN bus registers, press the Memory key (**A**) (R key lights up) followed by the R key (**B**).
3. Exit the service routine [→ 190].

8.10.4 S012: Test step 4

Display of CAN bus cycle on LEDs of modules

Selection field	Code	Function
1	00	LED display on the modules is switched off*
	01	LED display on the modules is switched on

* Factory setting



1. Call service routine S012.4 [→ 182].
   ↳ After selecting the service routine, selection field 1 displays the code for the current setting of the display (see table).
2. Use the arrow keys (**A**) in selection field 1 to select the required code and confirm your selection by pressing the T key (**B**).
3. Exit the service routine [→ 190].

The LEDs on the modules normally flash slowly (1 Hz) (for code 00). When code 01 has been selected and confirmed, the CAN bus clock pulse of the TTP protocol, which is output by the master module as a broadcast with a frequency of 20 Hz, is output on the LEDs (the green life LED flashes on DX7). Thus by "rocking through" the connectors, you can detect directly the contact loss of the module on the CAN bus. The activation or deactivation of this function simultaneously acts on all modules.

8.11 S017: Configuration service

SR*	SA**	Function
S017		Unit configuration
S017.2	Yes	Confirming the unit version
S017.3	Yes	Enter the country group code
S017.4 (for "GALILEOS Comfort" and "GALILEOS Comfort^{PLUS}")	Yes	Select a language
S017.5 (for "GALILEOS Comfort" and "GALILEOS Comfort^{PLUS}")	Yes	Select a language set
S017.6	Yes	Enable/disable the remote control
S017.7	Yes	Configure the switching plate for the swivel arm
S017.13 (for "GALILEOS Comfort" and "GALILEOS Comfort^{PLUS}")	Yes	Enable/disable the welcome screen
S017.14 (for "GALILEOS Comfort" and "GALILEOS Comfort^{PLUS}")	Yes	Enable/disable certain lines of the welcome screen
S017.15	Yes	Activate/deactivate the acoustic signal for end of exposure
S017.25	Yes	Select the diaphragm type

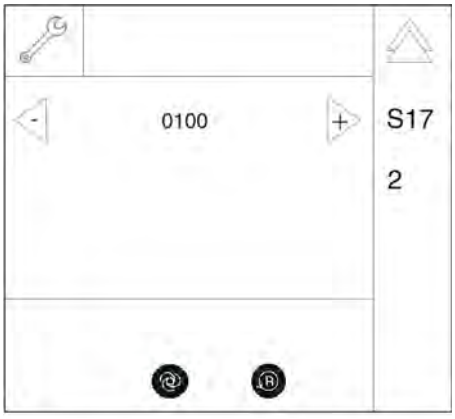
* SR=service routine, ** SA=security access

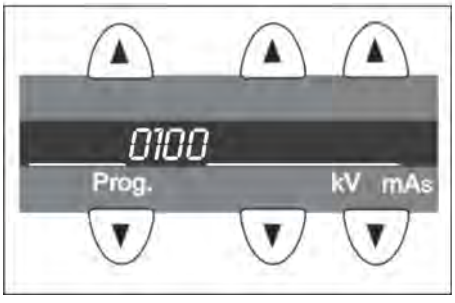
8.11.1 S017: Test step 2

Configuring the hardware version

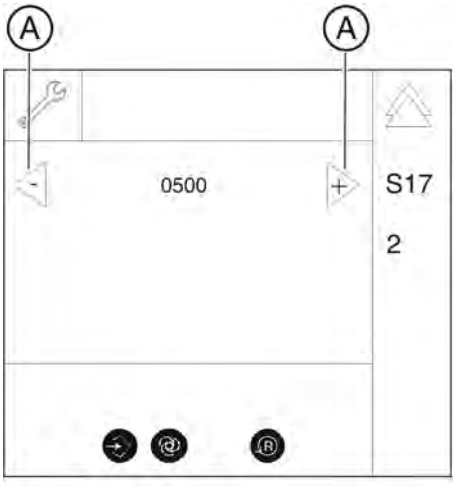
Selection field	Code	Function
1	0100	GALILEOS Comfort / GALILEOS Compact
	0500	GALILEOS Comfort / GALILEOS Compact incl. FACESCAN
	0800	GALILEOS Comfort^{PLUS}
	0C00	GALILEOS Comfort^{PLUS} incl. FACESCAN

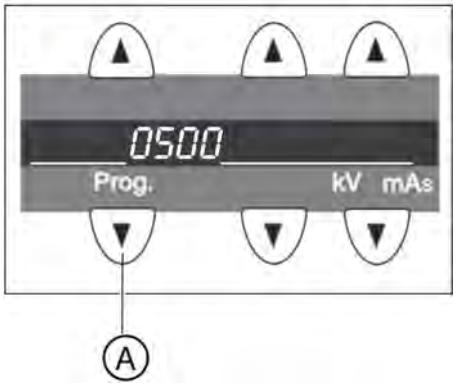
Factory setting for each configuration





1. Call service routine S017.2 [→ 190].
   - Once the service routine has been selected, the code for the current setting is displayed in selection field 1.
   - Memory key (**A**) (Easypad) or the LED above Memory key (**A**) (Multipad) lights up.





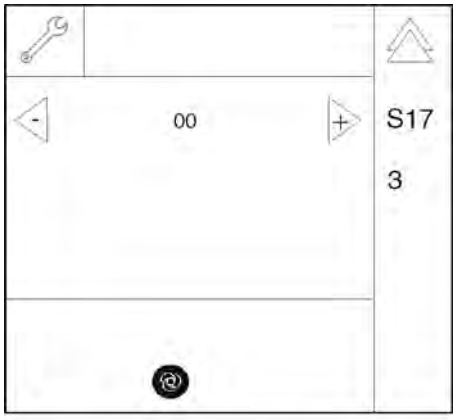
2. Use the arrow keys (**A**) to select the code for the required hardware version in selection field 1 (see table).
   - Once the hardware version has been selected, Memory key (B) (Easypad) or the LED above Memory key (B) (Multipad) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

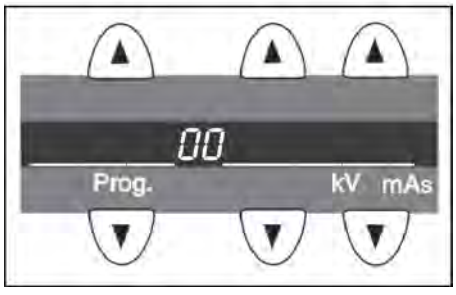
8.11.2 S017: Test step 3

Enter the country group code

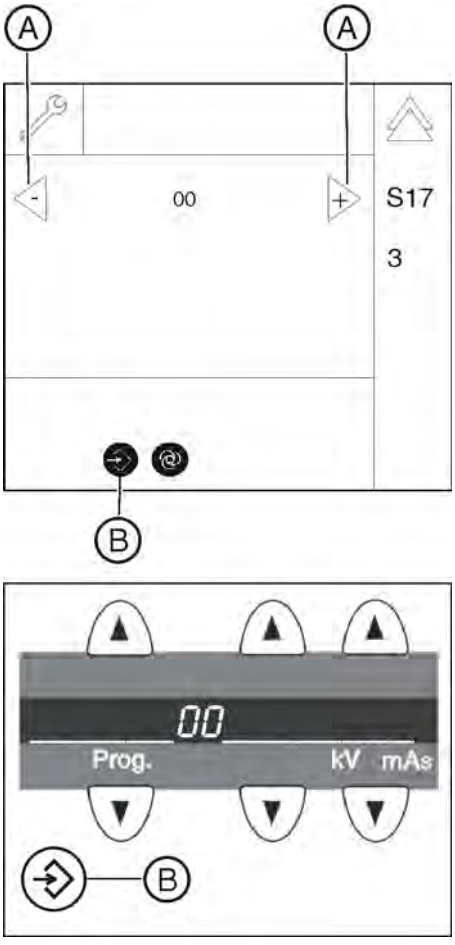
Selection field	Code	Function
1	00	Worldwide*
	01	Asia
	02	USA
	03	France CTDI-DAP

* Factory setting





1. Call service routine S017.3 [→ 182].
   ↳ Once the service routine has been selected, the code for the current setting is displayed in selection field 1.



2. Use arrow keys (**A**) to select the required country group code in selection field 1 (see table).
   ↳ Once the country group code has been selected, Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

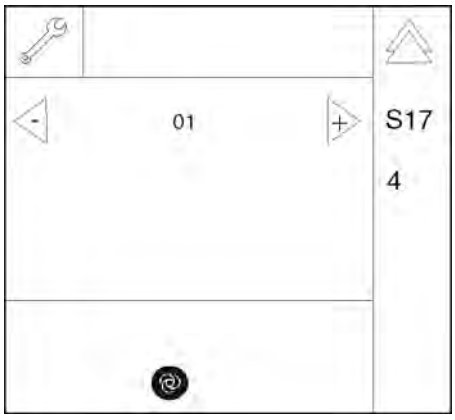
8.11.3 S017: Test step 4

Select a language

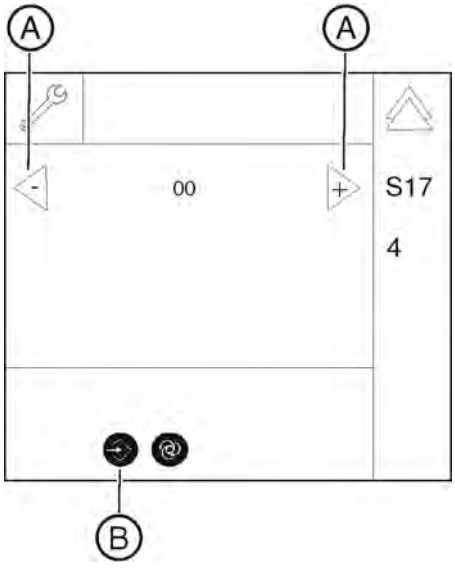
Selection field	Code	Function*
1	00	English
	01	German
	02	French
	03	Italian
	04	Dutch
	05	Spanish
	06	Russian
	08	Portuguese
	10	Chinese (PRC)
	11	Korean
	12	Japanese
	13	Chinese (Taiwan)

* Factory setting varies by order

1. Call service routine S017.4 [→ 182].



↳ Once the service routine has been selected, the code for the current setting is displayed in selection field 1.



2. Use the arrow keys (**A**) to select the code for the required language in selection field 1 (see table).
   ↳ Once the language has been selected, the Memory key (**B**) lights up.
3. Save the setting [→ 188].
   IMPORTANT: If the selected language is not in the installed language set (S017: Test step 5 [→ 222]), "English" is set by default.
4. Exit the service routine [→ 190].

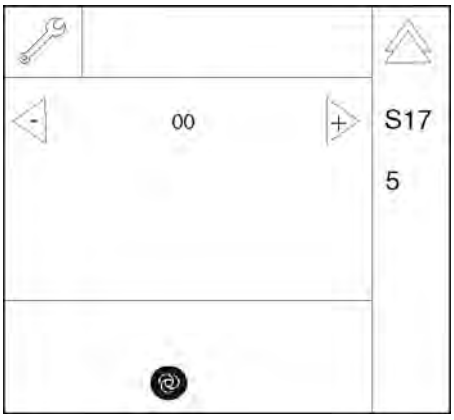
8.11.4 S017: Test step 5

Select a language set

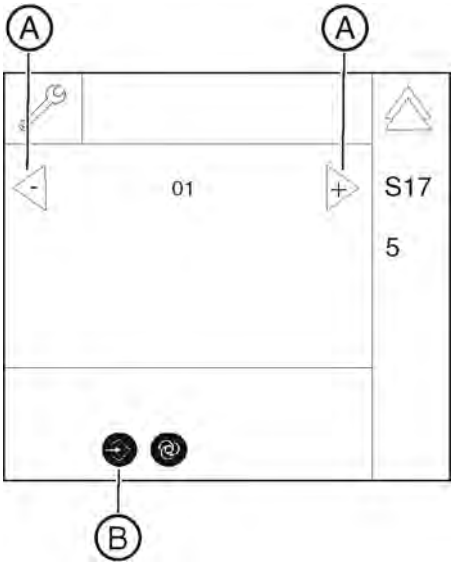
IMPORTANT
A software update must be performed [→ 47] every time the language set changes, in order to install the corresponding languages in the system.

Selection field	Code	Function*
1	00	German, English, French, Italian
	01	German, English, French, Dutch
	02	German, English, Spanish, Russian
	03	German, English, Korean, Japanese
	04	German, English, Spanish, Portuguese
	05	German, English, Chinese (PRC), Chinese (Taiwan)

* Factory setting varies by order



1. Call service routine S017.5 [→ 182].
   ↳ Once the service routine has been selected, the code for the current setting is displayed in selection field 1.



2. Use the arrow keys (**A**) to select the code for the required language set in selection field 1 (see table).
   ↳ Once the language set has been selected, the Memory key (**B**) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

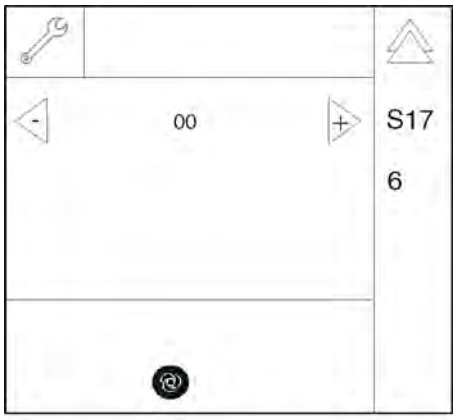
8.11.5 S017: Test step 6

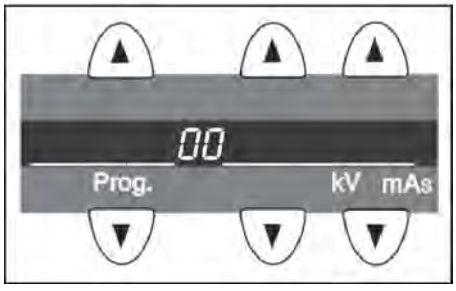
Enable/disable the remote control

Selection field	Code	Function
1	00	Remote control disabled*
	01	Remote control enabled

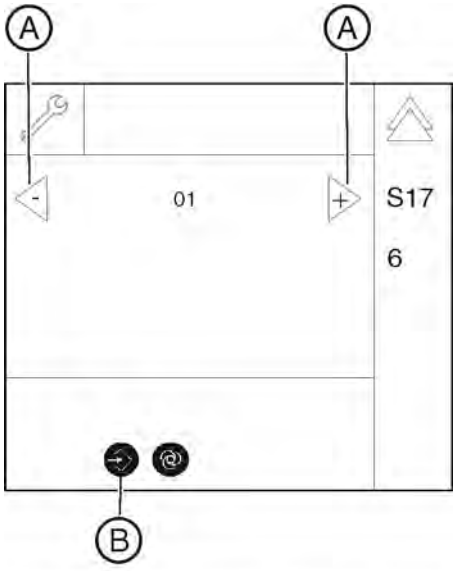
* Factory setting

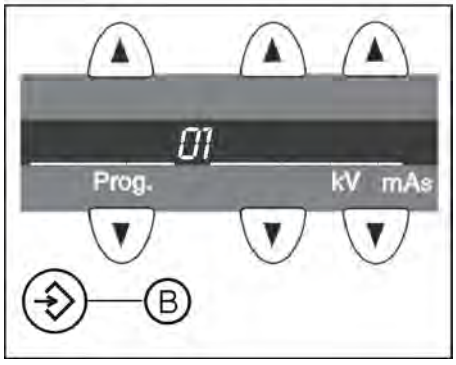
1. Call service routine S017.6 [→ 182].





↳ Once the service routine has been selected, the code for the current setting is displayed in selection field 1.





2. Use arrow keys (**A**) to select the code for the required setting in selection field 1 (see table).
   ↳ Once the required setting has been selected, Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

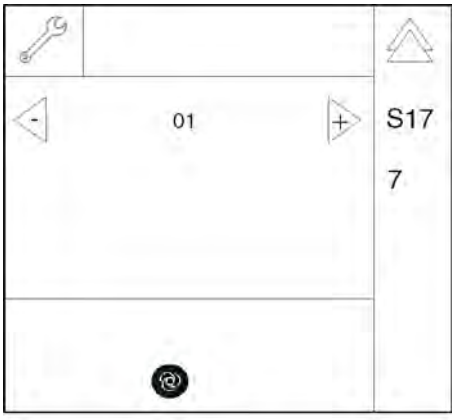
8.11.6 S017: Test step 7

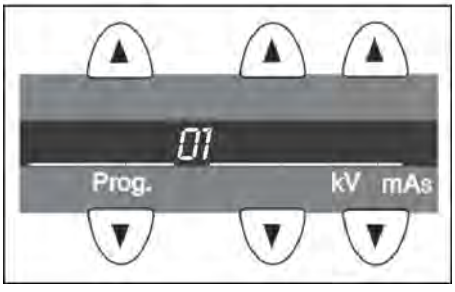
Configuring the switching plate for the swivel arm

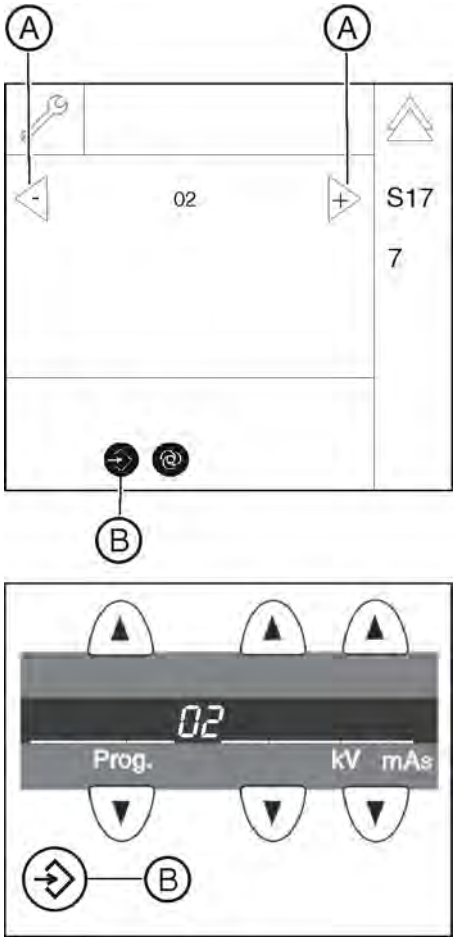
Selection field	Code	Function
1	01	up to unit serial number 1079
	02	unit serial number 1080 or higher*

* Factory setting

1. Call service routine S017.7 [→ 182].
   ↳ Once the service routine has been selected, the code for the current setting is displayed in selection field 1.







2. Use arrow keys (**A**) to select the required country group code in selection field 1 (see table).
   ↳ Once the required setting has been selected, Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

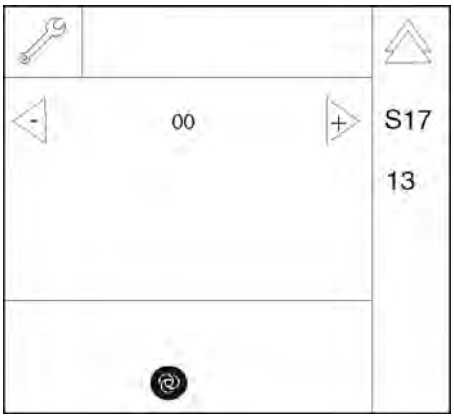
8.11.7 S017: Test step 13

Enable/disable the welcome screen

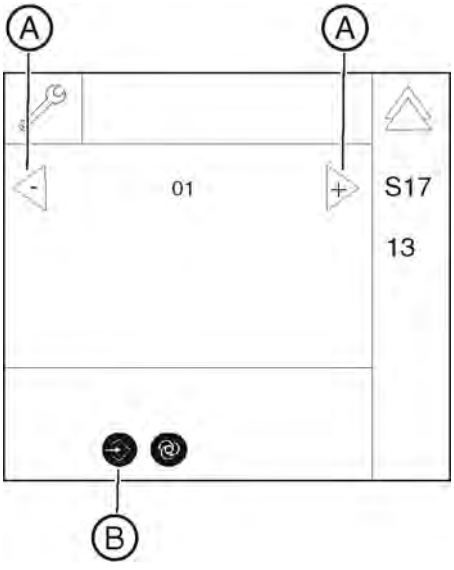
Selection field	Code	Function
01	00	Welcome screen disabled
	01	Welcome screen enabled*

* Factory setting

1. Call service routine S017.13 [→ 182].



↳ Once the service routine has been selected, the code for the current setting is displayed in selection field 1.



2. Use arrow keys (**A**) to select the required setting in selection field 1 (see table).
   ↳ Once the required setting has been selected, the Memory key (**B**) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

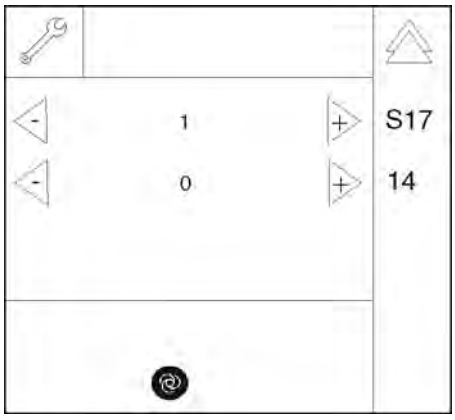
8.11.8 S017: Test step 14

Enable/disable certain lines of the welcome screen

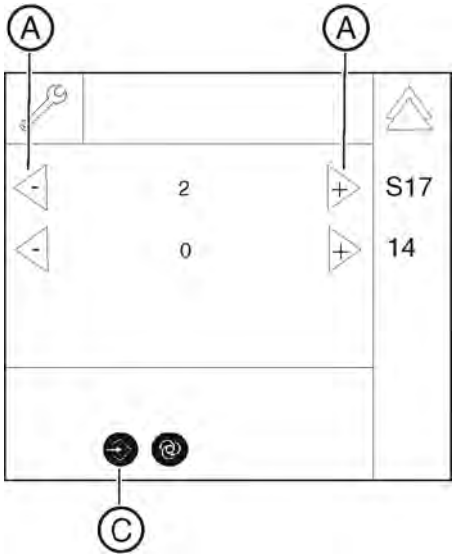
Selection field	Code	Meaning/Function
1	1	First name
	2	Last name
	3	Date of birth
	4	Patient number
2	0	Inactive*
	1	Active

* Factory setting

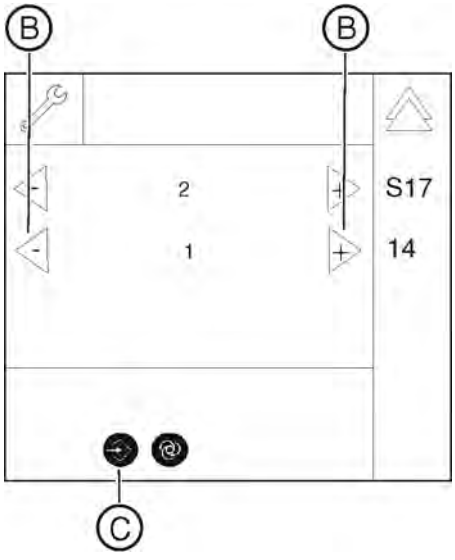
1. Call service routine S017.14 [→ 182].



↳ Once the service routine has been selected, the code for the line currently selected is displayed in selection field 1.



2. Use the arrow keys (**A**) to select the required line in selection field 1 (see table).
   ↳ The activation status code is displayed in selection field 2.



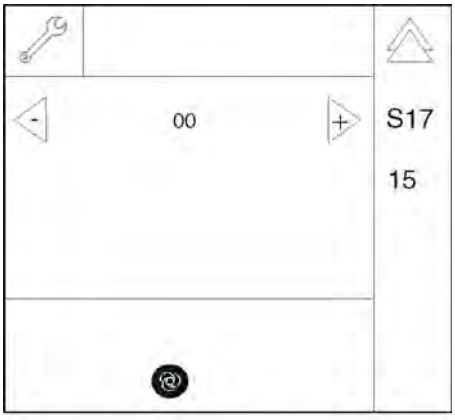
3. Use the arrow keys (**B**) to select the code for the required state of the line selected in selection field 1 in selection field 2 (see table).
   ↳ Once the required setting has been selected, the Memory key (**C**) lights up.
4. Save the setting [→ 188].
5. Exit the service routine [→ 190].

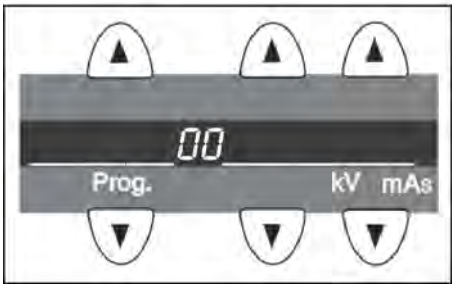
8.11.9 S017: Test step 15

Selection field	Code	Function
1	00	Acoustic signal indicating the end of the exposure is disabled
	01	Acoustic signal indicating the end of the exposure is enabled*

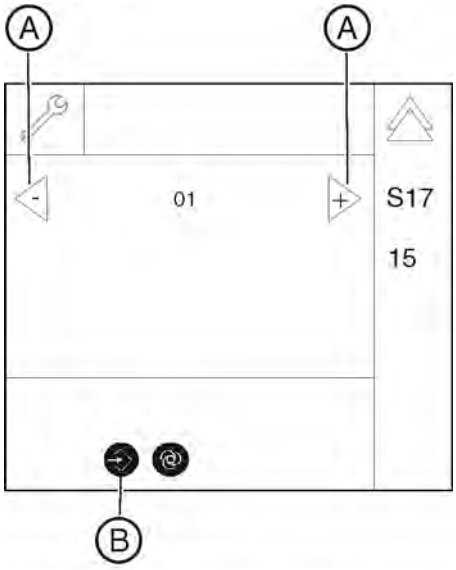
* Factory setting

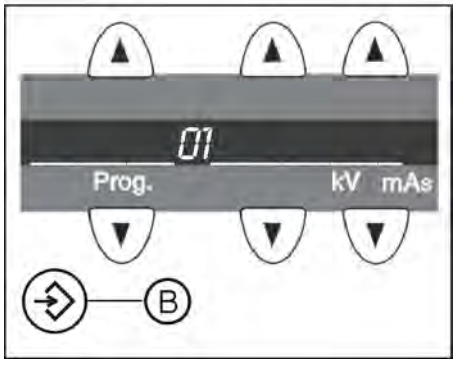
Activate/deactivate the acoustic signal for end of exposure





1. Call service routine S017.15 [→ 182].
   ↳ Once the service routine has been selected, the code for the current setting is displayed in selection field 1.





2. Use arrow keys (**A**) to select the required setting in selection field 1 (see table).
   ↳ Once the required setting has been selected, Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

8.11.10 S017: Test step 25

Select the diaphragm type

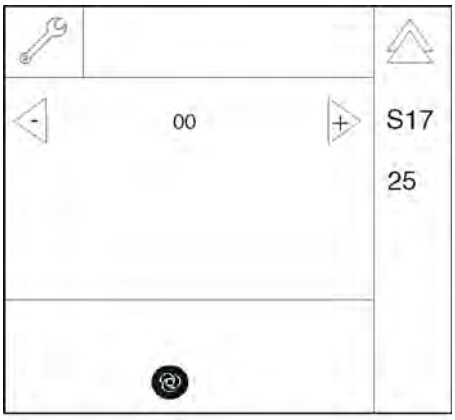
Selection field	Code	Function
1	00	Type 1 diaphragm ("GALILEOS Compact")
	01	Type 1/Type 2 diaphragm ("GALILEOS Comfort")
	02	Type 3 diaphragm ("GALILEOS Compact")*
	03	Type 3 diaphragm ("GALILEOS Comfort")**
	07	Type 3 diaphragm ("GALILEOS Comfort^{PLUS}")***

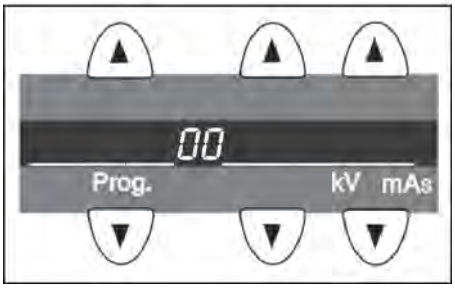
* Factory setting for GALILEOS Compact

** Factory setting for GALILEOS Comfort

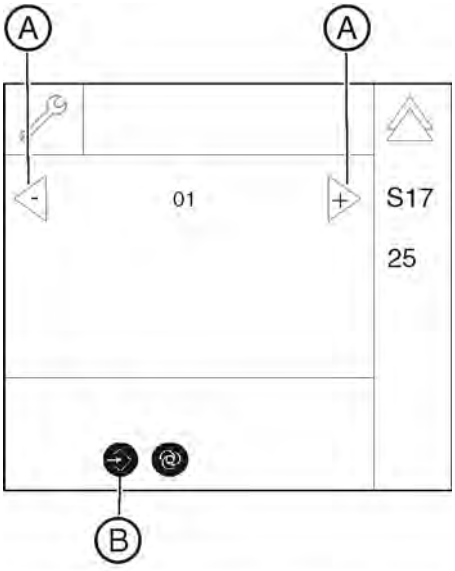
*** Factory setting for GALILEOS Comfort^{PLUS}

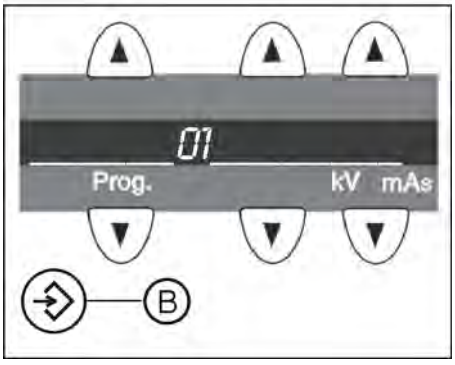
1. Call service routine S017.25. [→ 182]





↳ Once the service routine has been selected, the code for the current setting is displayed in selection field 1.





2. Use arrow keys (**A**) to select the required code in selection field 1 (see table).
   ↳ Once the required setting has been selected, Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

8.12 S018: Service for height adjustment

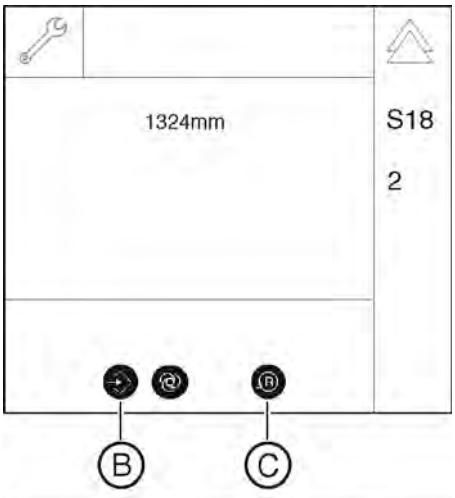
SR*	SA**	Function
S018		Service for height adjustment
S018.2	No	Set the maximum travel height
S018.3	No	Undo the maximum travel height setting
S018.4	No	Check the height adjustment sensor system
S018.5	No	Setting the minimum travel height
S018.6	No	Undoing the minimum travel height setting

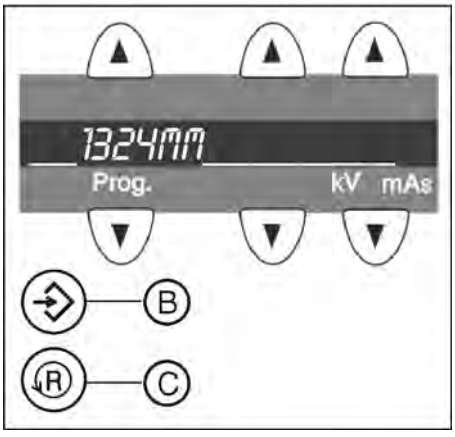
* SR=service routine, ** SHZ=security access

8.12.1 S018: Test step 2

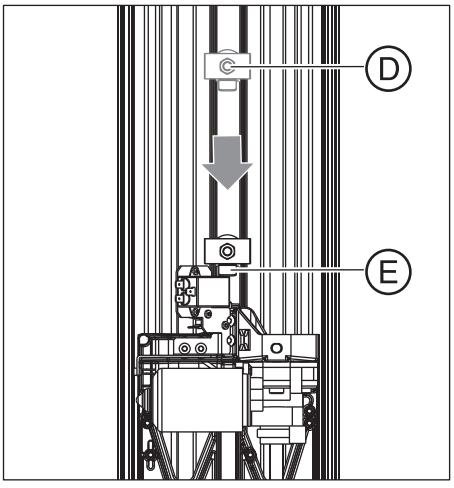
Set the maximum travel height

1. Move the unit to the required maximum travel height by pressing the Up/Down keys in the user mode on the control panel.
2. Call service routine S018.2 [→ 182].
   - Once the service routine has been selected, the current height position is displayed in selection field 1.
   - Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.





3. To save the maximum travel height, press Memory key (**B**) (R key (**C**) lights up) followed by R key (**C**).

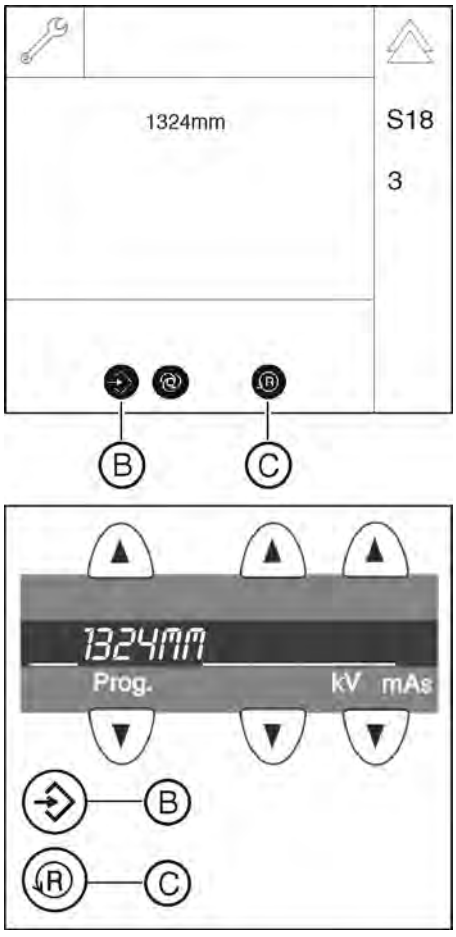


4. Set the mechanical limit stop at the unit:
   Loosen nut (**D**) and move mechanical limit stop (**E**) for the limit switch until it engages. Tighten nut (**D**) again.
   The next time the UP key is pressed, the unit stops 10 mm below the limit switch.
5. Exit the service routine [→ 190].

8.12.2 S018: Test step 3

Undo the maximum travel height setting

1. Call service routine S018.3 [→ 182].
   ↳ Once the service routine has been selected, the current height position is displayed in selection field 1.



↳ Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.

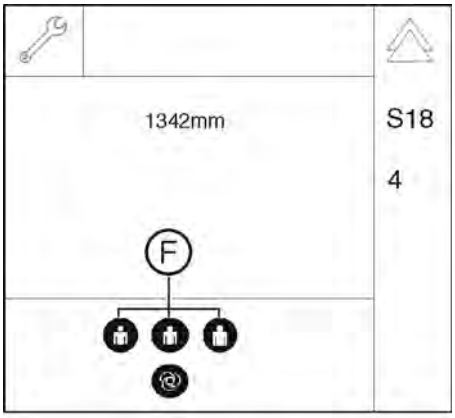
2. To undo the maximum travel height setting, press Memory key (**B**) (R key (**C** (Easypad) or LED above R key (**C**) lights up) followed by R key (**C**).
3. Exit the service routine [→ 190].

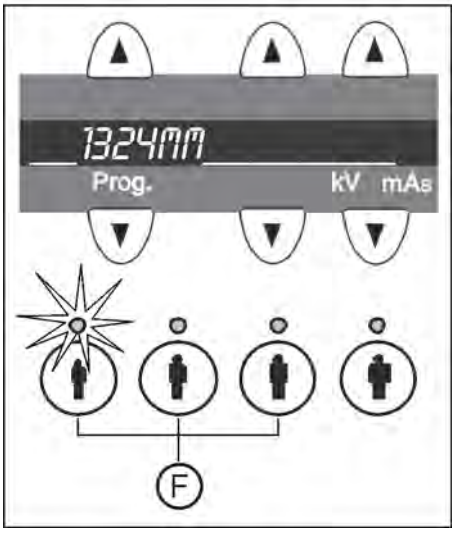
8.12.3 S018: Test step 4

Check the height adjustment sensor system

This service routine is used to move the unit up or down as far as the limit switches using the Up/Down keys on the control panel. The "soft limit positions" set by the software are ignored in this case.

Display on the control panel	Status	Meaning
Patient symbol key 1	lit	Correction switch activated
	not lit	Correction switch not activated
Patient symbol key 2	lit	Lower limit switch activated
	not lit	Lower limit switch not activated
Patient symbol key 3	lit	Upper limit switch activated
	not lit	Upper limit switch not activated





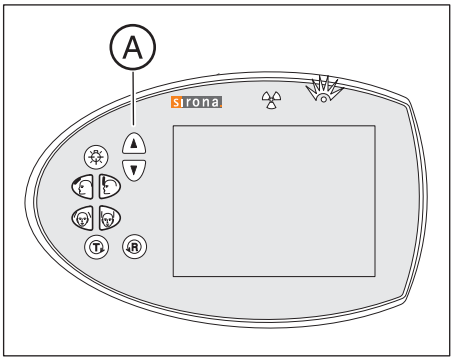
1. Call service routine S018.4 [→ 182].
   - Once the service routine has been selected, the current height position is displayed in selection field 1.
   - Patient symbol keys 1 to 3 (**F**) show the switching state of the limit switches (see table).
     If the patient symbol key (Easypad) or the LED above the patient symbol key (Multipad) is lit, the corresponding switch is activated, i.e. the unit is at a position value greater than 1500.

2. Use the UP/DOWN keys on the control panel to move the unit up and down and use the patient symbol keys (**F**) to check the switching states.
3. Exit the service routine [→ 190].

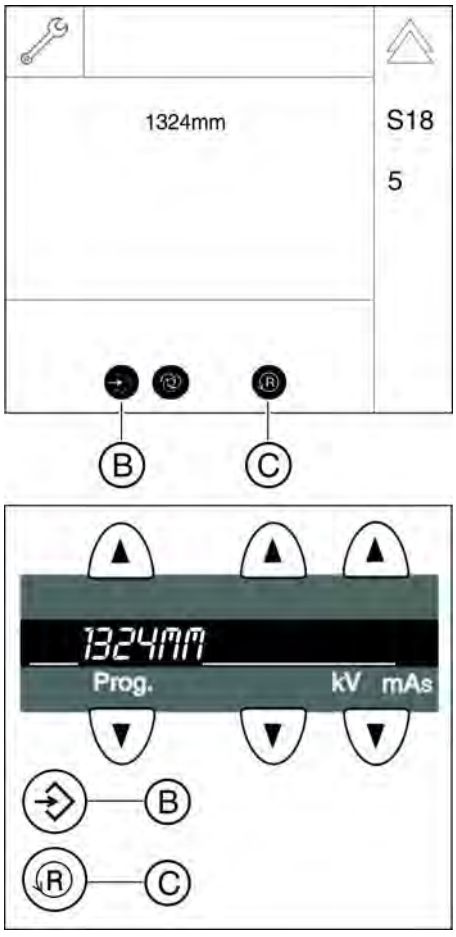
8.12.4 S018: Test step 5

Setting the minimum travel height

Setting the minimum travel height is possible only for a unit height that is below the lower correction switch level (< position value of 1500)!



1. In user mode, move the unit to the required minimum travel height by pressing the Up/Down keys (**A**).
2. Call service routine S018.5 [→ 182].
   - Once the service routine has been selected, the current height position is displayed in selection field 1.
   - Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.



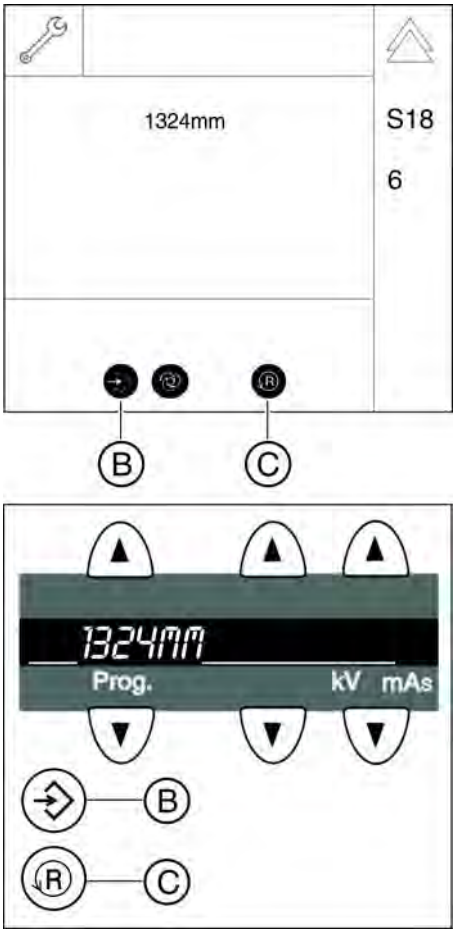
3. To save the maximum travel height, press Memory key (**B**) (R key (**C**) lights up) followed by R key (**C**).
4. Exit the service routine [→ 190].

The limitation of the minimum travel height is purely software based. The lower limit switch is not mechanically adapted to the new minimum travel height!

8.12.5 S018: Test step 6

Undoing the minimum travel height setting

1. Call service routine S018.6 [→ 182].
   - Once the service routine has been selected, the current height position is displayed in selection field 1.
   - Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.



2. To undo the minimum travel height setting, press Memory key (**B**) (R key (**C** (Easypad) or LED above R key (**C**) lights up) followed by R key (**C**).
3. Exit the service routine [→ 190].

8.13 S037: Network service

SR*	SA**	Function
S037		Network service
S037.1	No	Displaying the network data
S037.2	Yes	Delete network addresses or set them to factory defaults
S037.3	Yes	Set boot mode: DYNAMIC (DHCP/AutoIP) / STATIC (fixed address)
S037.4	Yes	Manual input of static network settings (IP address, default gateway address, and subnet mask)

* SR=service routine, ** SHZ=security access

8.13.1 S037: Test step 1

Displaying the network data

If all network data is set to default, the system is in UDP boot mode.

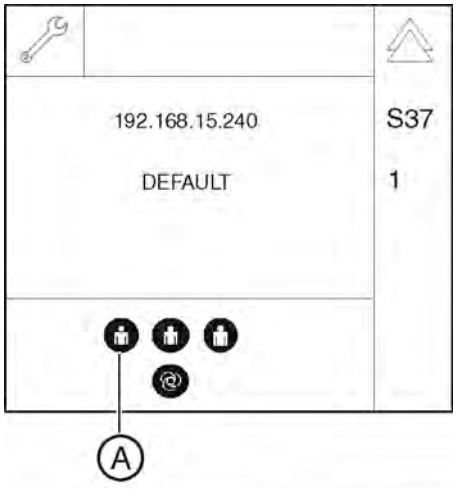
Symbol on the control panel	Status	Meaning
(LED above) patient symbol key 1 (**A**)	lit	The IP address is displayed in selection field 1*
(LED above) patient symbol key 2 (**B**)	lit	The default gateway is displayed in selection field 1
(LED above) patient symbol key 3 (**C**)	lit	The subnet mask is displayed in selection field 1

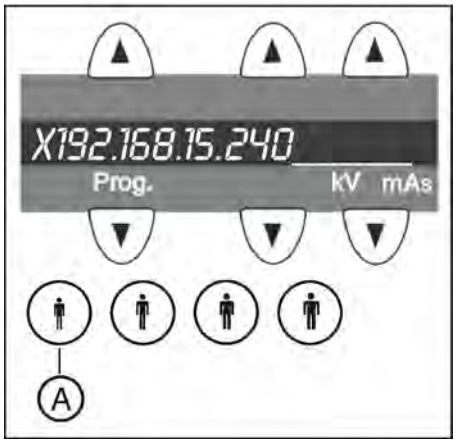
* Factory setting

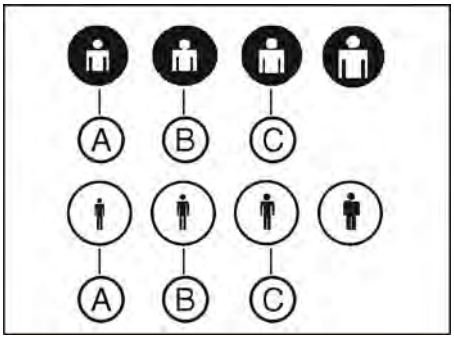
Selection field	Parameter/Display	Meaning
1	IP address, default gateway, or subnet mask of the unit	
2	default	Fixed address*
	static	Fixed address, modified setting
	dynamic	Automatic address assignment

* Factory setting

1. Call service routine S037.1 [→ 182].
   - Once the service routine has been selected, the IP address of the unit is displayed in selection field 1.
   - *Easypad:* "Default", "static" or "dynamic" is displayed in selection field 2 (see table).







2. You can display various items of network data in selection field 1 by pressing the patient symbol keys (**A**, **B**, or **C**) (see table).
   ↳ The patient symbol key selected in each case (Easypad) or the LED above the patient symbol key selected in each case (Multipad) lights up.
3. Exit the service routine [→ 190].

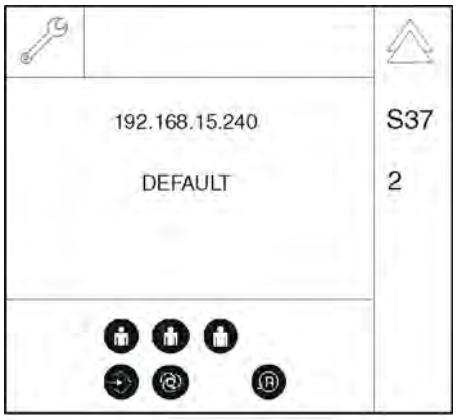
8.13.2 S037: Test step 2

Setting the default IP address, default gateway address and default subnet mask

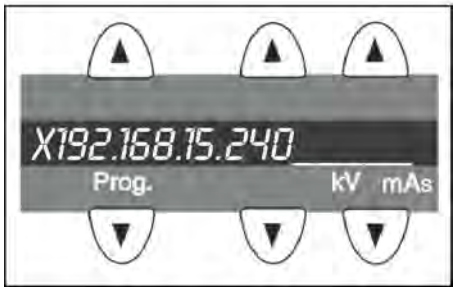
IMPORTANT
The network address can only be restored to the factory setting (default value) in fixed address boot mode (STATIC or no DHCP).

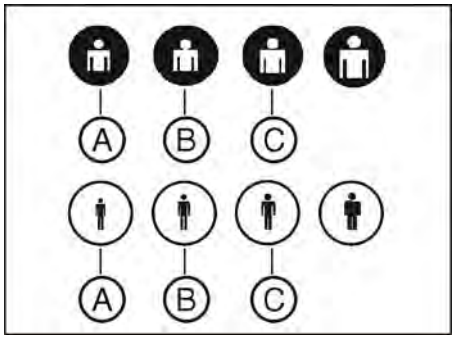
Symbol on the control panel	Status	Meaning
(LED above) patient symbol key 1 (**A**)	lit	The IP address is displayed in selection field 1*
(LED above) patient symbol key 2 (**B**)	lit	The default gateway is displayed in selection field 1
(LED above) patient symbol key 3 (**C**)	lit	The subnet mask is displayed in selection field 1

1. Call service routine S037.2 [→ 182].



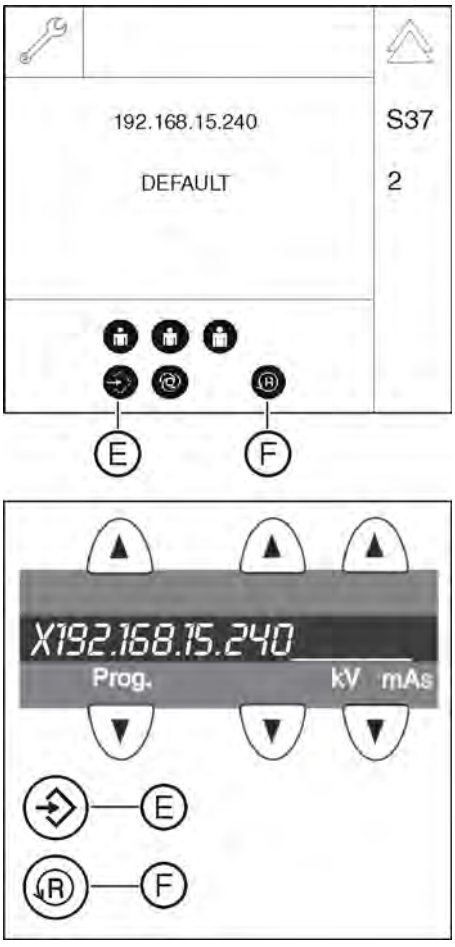
- Once the service routine has been selected, the network data is displayed as in test step 1.
- *Easypad:* The Memory key and the R key also become visible.
- The Memory key (Easypad) or the LED above the Memory key (Multipad) lights up.





2. Before restoring the factory settings, check the network data that is still in the system:
A = Show IP address
B = Show default gateway
C = Show subnet mask

- The patient symbol key selected in each case (Easypad) or the LED above the patient symbol key selected in each case (Multipad) lights up.



3. To reset the network data, press Memory key (**E**) (R key (Easypad) or LED above R key (Multipad) lights up) followed by R key (**F**).
   ↳ The default network data (factory default setting) is displayed. To switch between the display of the different network data, proceed as in test step 1.
4. Perform a restart of the device.
5. Exit the service routine [→ 190].

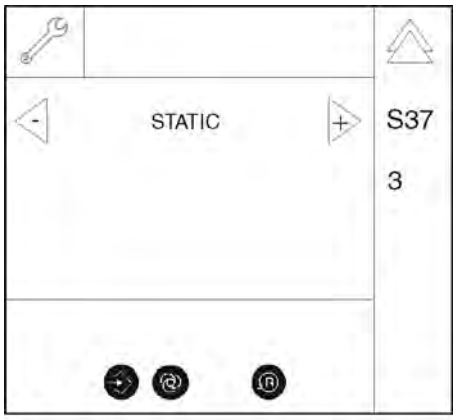
8.13.3 S037: Test step 3

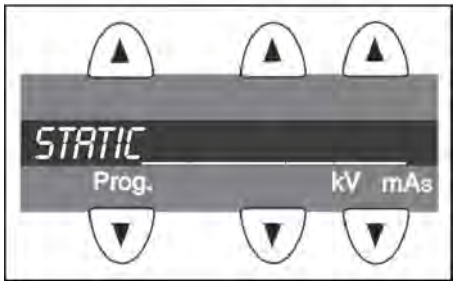
Configuring boot mode

Selection field	Parameter	Meaning
1	DYNAMIC	Automatic address assignment (DHCP/AutoIP)
	STATIC	Fixed address*

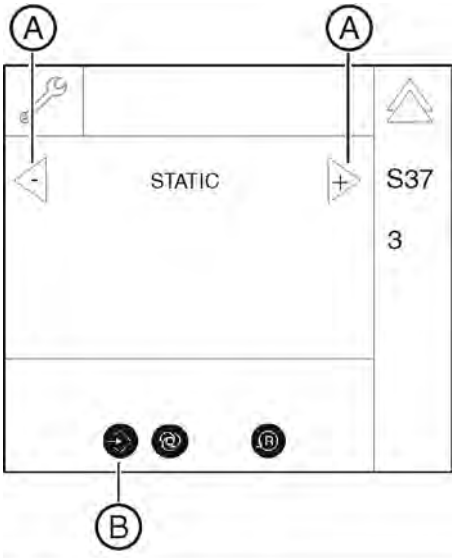
* Factory setting

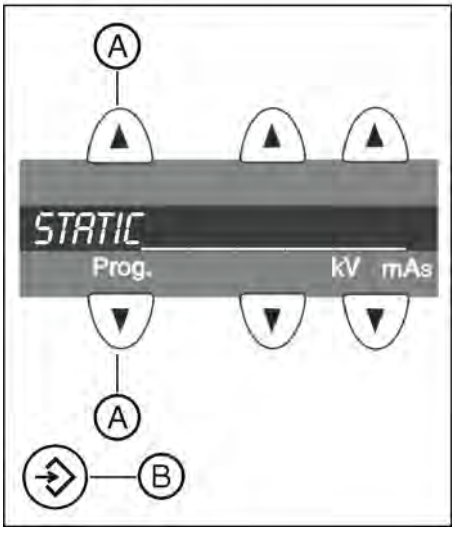
1. Call service routine S037.3 [→ 182].





↳ Once the service routine has been selected, the current boot mode of the unit is displayed in selection field 1.





2. Use arrow keys (**A**) to select the required boot mode "automatic address assignment" (DYNAMIC) or "fixed address" (STATIC) in selection field 1 (see table).
   ↳ Memory key (**B**) (Easypad) or the LED above Memory key (**B**) (Multipad) lights up.
3. Save the setting [→ 188].
4. Exit the service routine [→ 190].

8.13.4 S037: Test step 4

Manual input of static network settings (IP address, default gateway address, and subnet mask)

This service routine cannot run in DYNAMIC mode (T key is blocked).

Symbol on the control panel	Status	Function
(LED above) patient symbol key 1 (**A**)	lit	The IP address is displayed in selection field 1*
		or - after pressing the T key - number pad B1 is selected
(LED above) patient symbol key 2 (**B**)	lit	The default gateway is displayed in selection field 1
		or - after pressing the T key - number pad B2 is selected

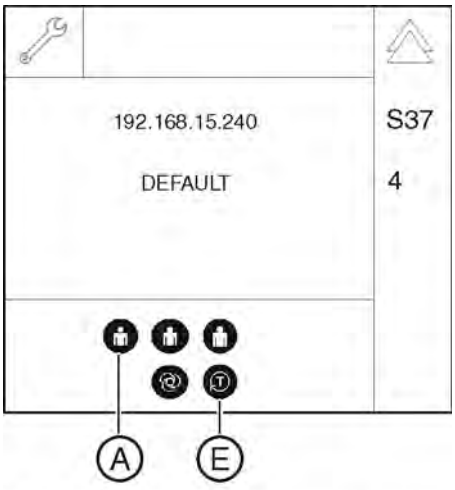
Symbol on the control panel	Status	Function
(LED above) patient symbol key 3 (**C**)	lit	The subnet mask is displayed in selection field 1
		or - after pressing the T key - number pad B3 is selected
(LED above) patient symbol key 4 (**D**)		or - after pressing the T key - number pad B4 is selected

* Factory setting

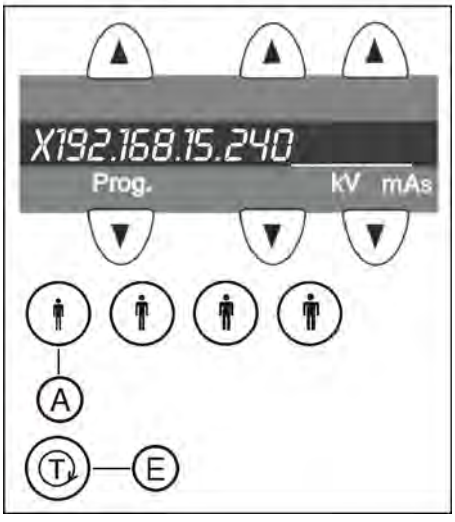
Selection field	Parameter/Display	Meaning
1	IP address, default gateway, or subnet mask of the unit	
	or - after pressing the T key - selected digit	
2	default	Fixed address*
	static	Fixed address, modified setting
	dynamic	Automatic address assignment

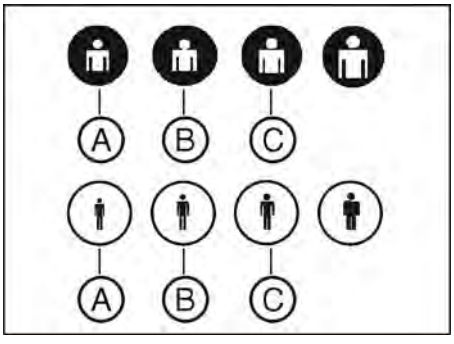
* Factory setting

1. Call service routine S037.4 [→ 182].

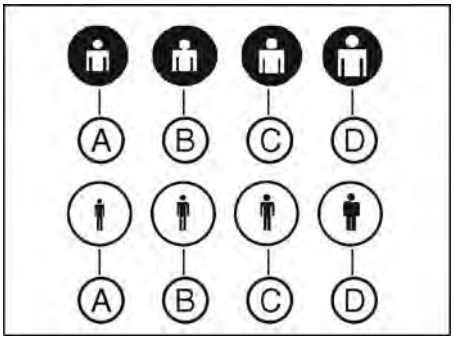


- Once the service routine has been selected, the IP address of the unit is displayed in selection field 1.
- *Easypad:* "DEFAULT", "STATIC" or "DYNAMIC" is displayed in selection field 2 (see table).

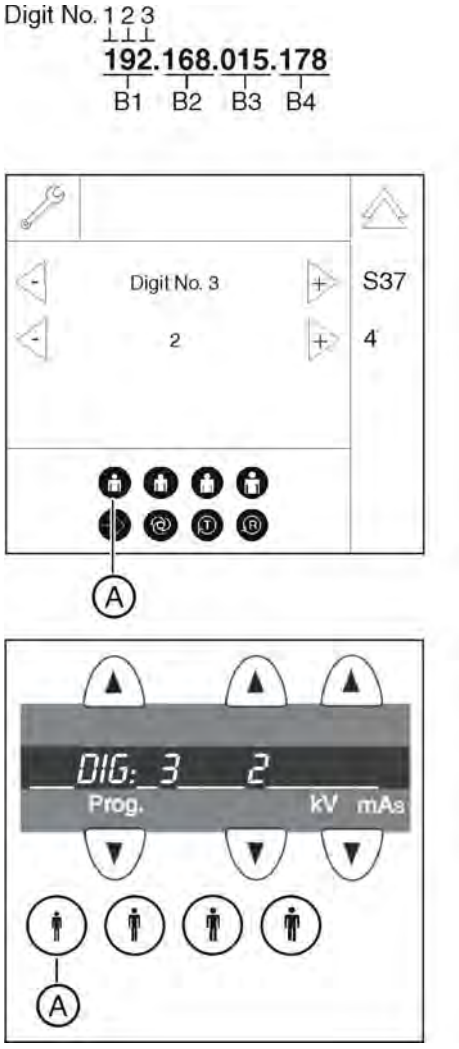




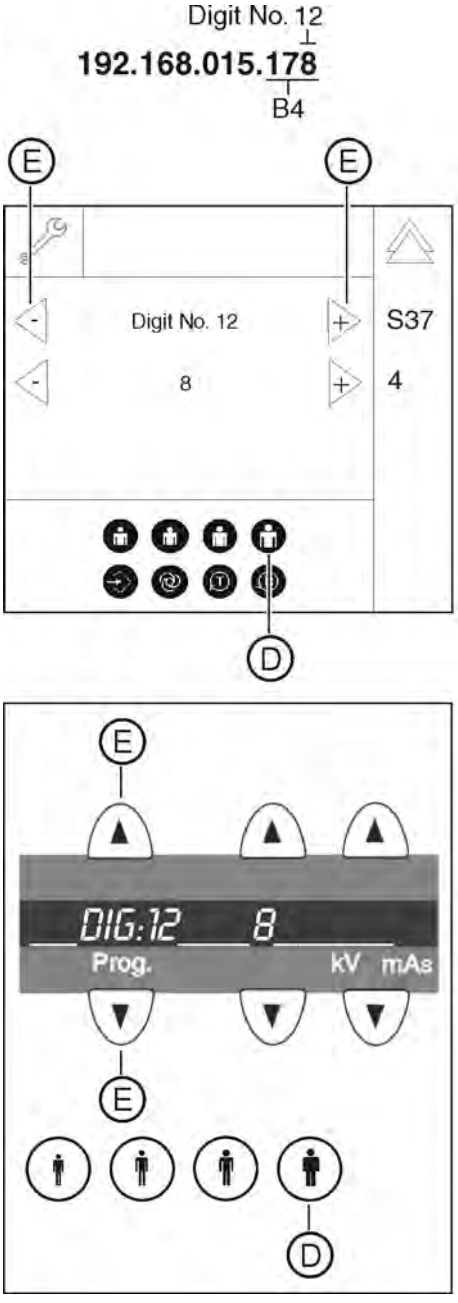
2. You can display various items of network data in selection field 1 by pressing the patient symbol keys (**A**, **B**, or **C**) (see table).
   - The patient symbol key selected in each case (Easypad) or the LED above the patient symbol key selected in each case (Multipad) lights up.
3. To change the selected parameter, first press the T key (**E**).



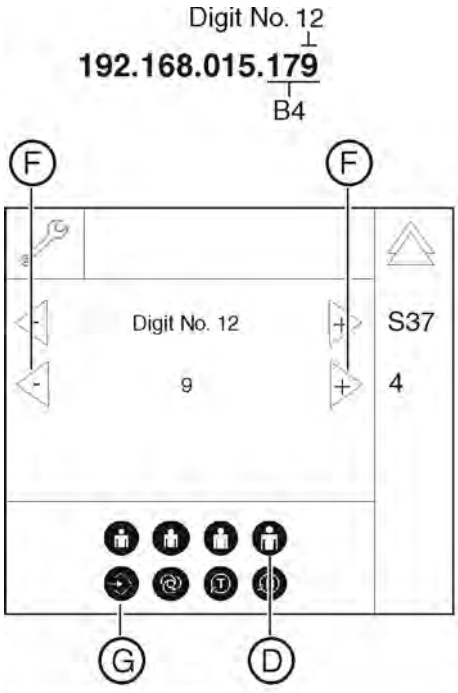
4. Now use the patient symbol keys to select the required number pad 1-4 (**A**-**D**) (see also table):
   A = Number pad B1
   B = Number pad B2
   C = Number pad B3
   D = Number pad B4
   - The patient symbol key selected in each case (Easypad) or the LED above the patient symbol key selected in each case (Multipad) lights up.

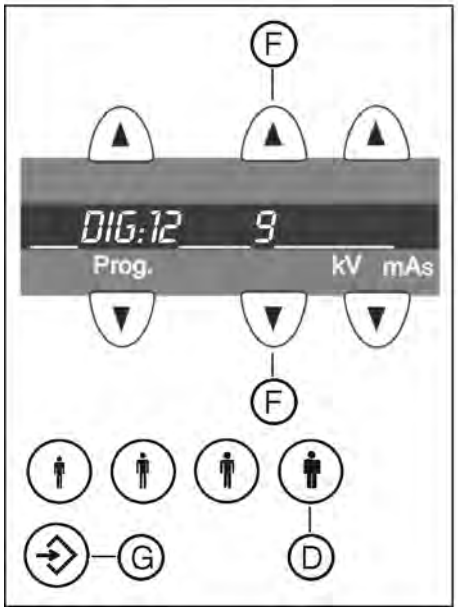


- The digit currently selected for changing is displayed in selection field 1 ("Digit No. 3" in the example).
  Important: The number of the digit always refers to the currently selected number pad.
- The current value of the corresponding digit is displayed in selection field 2 ("2" in the example).



5. Use arrow keys (**E**) to select the digit to be changed in selection field 1 ("Digit No. 12" in the example).
   - The corresponding patient symbol key (**D**) or the LED above the corresponding patient symbol key (**D**) lights up.
   - Selection field 2 displays the value of the currently selected digit.





6. To change the value for the digit, use arrow keys (**F**) in selection field 2.
   ↳ Memory key (**G**) (Easypad) or the LED above Memory key (**G**) (Multipad) lights up.
7. Save the setting [→ 188].
8. Exit the service routine [→ 190].
9. Perform a restart of the device.

9 Repair

⚠ DANGER

Perilous shock hazard!

It is essential to switch the unit off and to wait at least 1 minute, or 4 minutes if disconnecting the tube assembly (cable L3), before starting the repair or taking off a cover panel!
When replacing parts in the vicinity of the power connection, power switch, board DX32 or X-ray tube assembly, the unit must be disconnected from the junction box of the main building!

⚠ CAUTION

Make sure to reattach all ground cables to ensure correct grounding of all modules.

⚠ CAUTION

Product safety

Modifications to this unit which might affect the safety of the system owner, patients or other persons are prohibited by law! For reasons of product safety, this product may be operated only with original Sirona accessories or third-party accessories expressly approved by Sirona. The user is responsible for any damage resulting from the use of non-approved accessories.

NOTICE

Do not damage the cables

Be careful not to kink the cables when removing or installing them. Take particular care with fiber-optic cables L5, L6, L7, and L15. Tighten cable ties only as far as the contact and do not apply force.

NOTICE

Risk of damage to boards

Please observe the usual precautionary measures for handling printed circuit boards (ESD). Touch a ground point to discharge static electricity before touching any boards.

IMPORTANT

After replacing boards or modules containing boards, check to make sure that the software version of the module corresponds to the current software status of the system. The software versions of the modules can be queried by running service routine S008.2 or using the extended detail query in SiXABCon. You can also check the info screen in advance to determine whether the current software constellation is permissible. If this is not the case, the version number of the entire software is labeled with an asterisk (e.g. V03.03.01*).

IMPORTANT

When replacing modules, be sure to note which ones contain boards and follow the instructions in the section titled Measures following replacement of boards. Also check whether the current software CD or the SIRONA dealer page contains any additional more up-to-date information about module replacement.
Be sure to follow the instructions about how to proceed following module replacement. You will find this information at the end of each set of repair instructions.

9.1 Safety checks

After implementing repair work, protective conductors and device leakage current checks must be carried out (see the sections on "Checking protective conductor" and "Checking device leakage current").

9.2 Height adjustment motor (M1_4)/spindle

9.2.1 Preparing for motor replacement

1. Switch the unit on.
2. Use the Up/Down keys on the control panel to move the slide up.
3. Switch the unit off again.
4. Remove the covers:
   – Intermediate piece
   – Profile covers (top and bottom)
   Tip: While loosening the screws, press the top profile cover down towards the unit and allow it to slide down once the screws are loose.
   – Arm cover
   – Slide cover rear, center
   – Slide cover rear, top
   – Slide cover rear, bottom and
   – Slide cover front.

Tip: If the height adjustment motor is inoperative, you can also move the slide manually [→ 251].

9.2.1.1 Moving the slide manually

⚠ CAUTION

Risk of injury due to uncontrolled movement of the slide

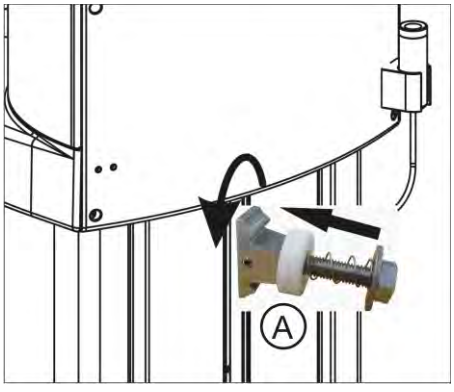
If the slide can no longer be moved electrically, it must be moved mechanically.

The position of the slide must be secured to ensure that no uncontrolled downward movement occurs during service, in cases where the carriage has fewer self-locking properties.
For this purpose, Sirona recommends using the free height adjustment service kit, REF. 62 57 518. This service kit is used to prevent automatic downward movement of the slide during service by fixing the slide and the spindle holder.
The clamp (**A**) should be clamped under the slide. The locking pin (**B**) is used to secure the spindle holder against twisting.

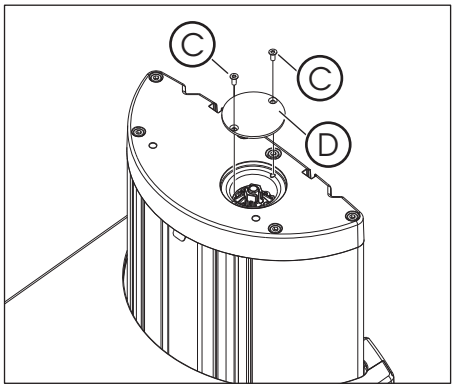
It must be ensured that no one is located underneath the ring arm during the repair.

9.2.1.1.1 Moving the slide with the "height adjustment" service kit, REF. 62 57 518

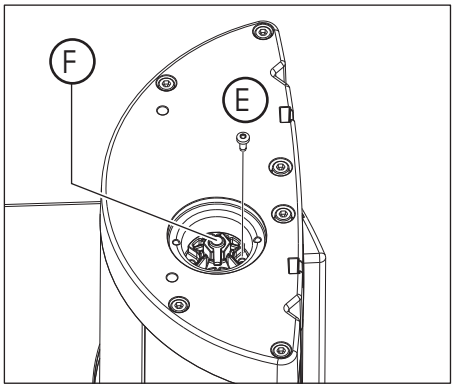
Move the slide



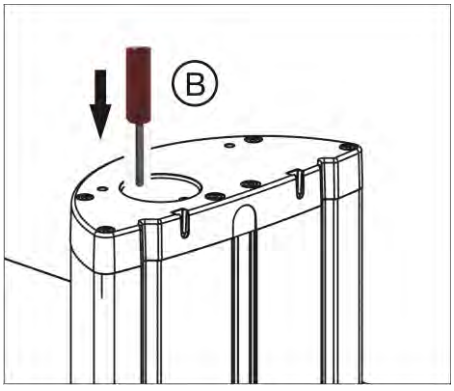
1. Insert the clamp through the opening (**A**) in the stand and rotate it 90°. Tighten the nut securely.



2. Loosen the two screws (**C**) and remove the cover (**D**).



3. Remove the 1st screw (**E**) on the spindle holder (**F**).



4. Insert the locking pin (**B**) into this opening.
5. Remove the 2nd screw (**E**) on the spindle holder.
6. Attach the socket wrench (SW19) to the spindle. Remove the locking pin and then turn the slide up to the desired height using the socket wrench.
   Clockwise rotation of spindle = slide moves up
   Counterclockwise rotation of spindle = slide moves down
7. Reinsert the locking pin.

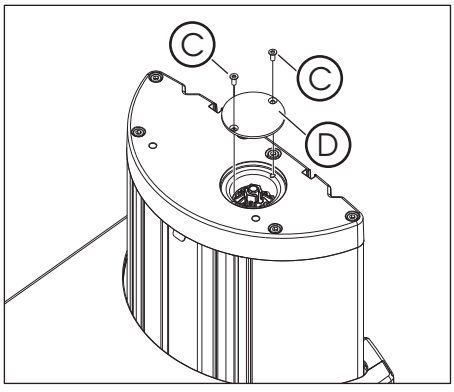
Locking the slide

➢ Now move the clamp (**A**) directly underneath the slide.

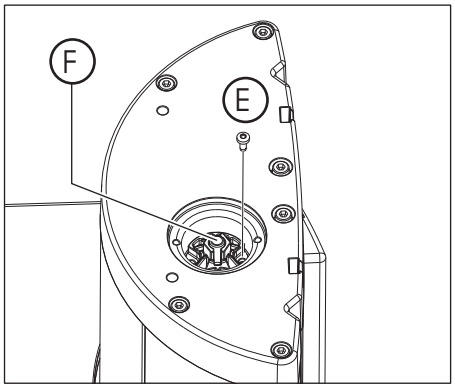
↳ The slide is now locked in this position for further repair work.

9.2.1.1.2 **Moving the slide without the "height adjustment" service kit, REF. 62 57 518**

Move the slide



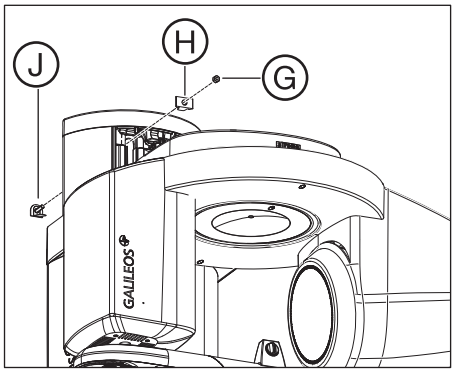
1. Loosen the two screws (**C**) and remove the cover (**D**).



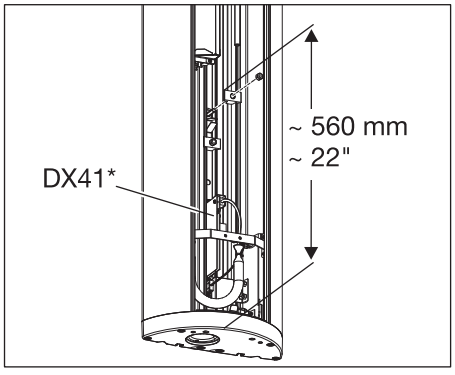
2. Loosen the 1st of the two screws (**E**) on the spindle holder (**F**).

3. Attach the socket wrench (SW19) to the spindle. Hold it firmly in place while you unscrew the 2nd of the two screws (**E**).
CAUTION! If the socket wrench has to be reset, secure the spindle holder against turning, e.g. by using a screw.
4. Rotate the spindle holder using a socket wrench (SW19) to move the slide to the required height.
Clockwise rotation of spindle = slide moves up
Counterclockwise rotation of spindle = slide moves down
5. After reaching the desired target position, secure the position again using the two screws (**E**).
CAUTION! Before replacing the height adjustment motor, the slide must be secured in this position.

Locking the slide



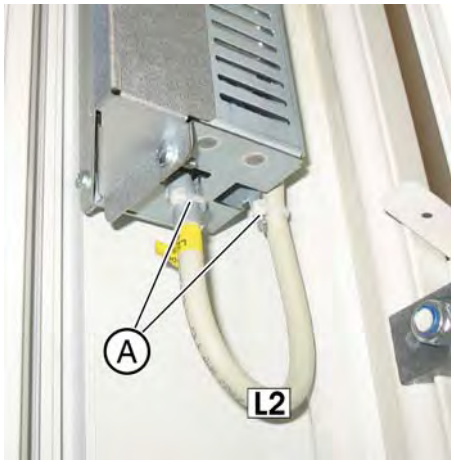
1. Make a mark at the position of the upper limit stop.
2. Loosen nut (**G**) on the upper profile clamp (**H**) and remove the upper limit stop (**J**) from the stand.



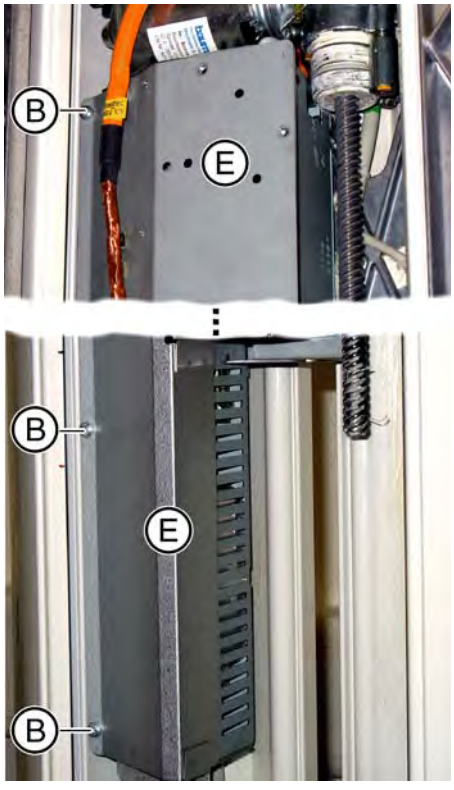
3. Install limit stop (**J**) above the lower limit stop so that there is a *distance of 31 cm* between the upper edge of the upper screw on board DX41 and the lower edge of the limit stop.

9.2.2 Removing board DX32

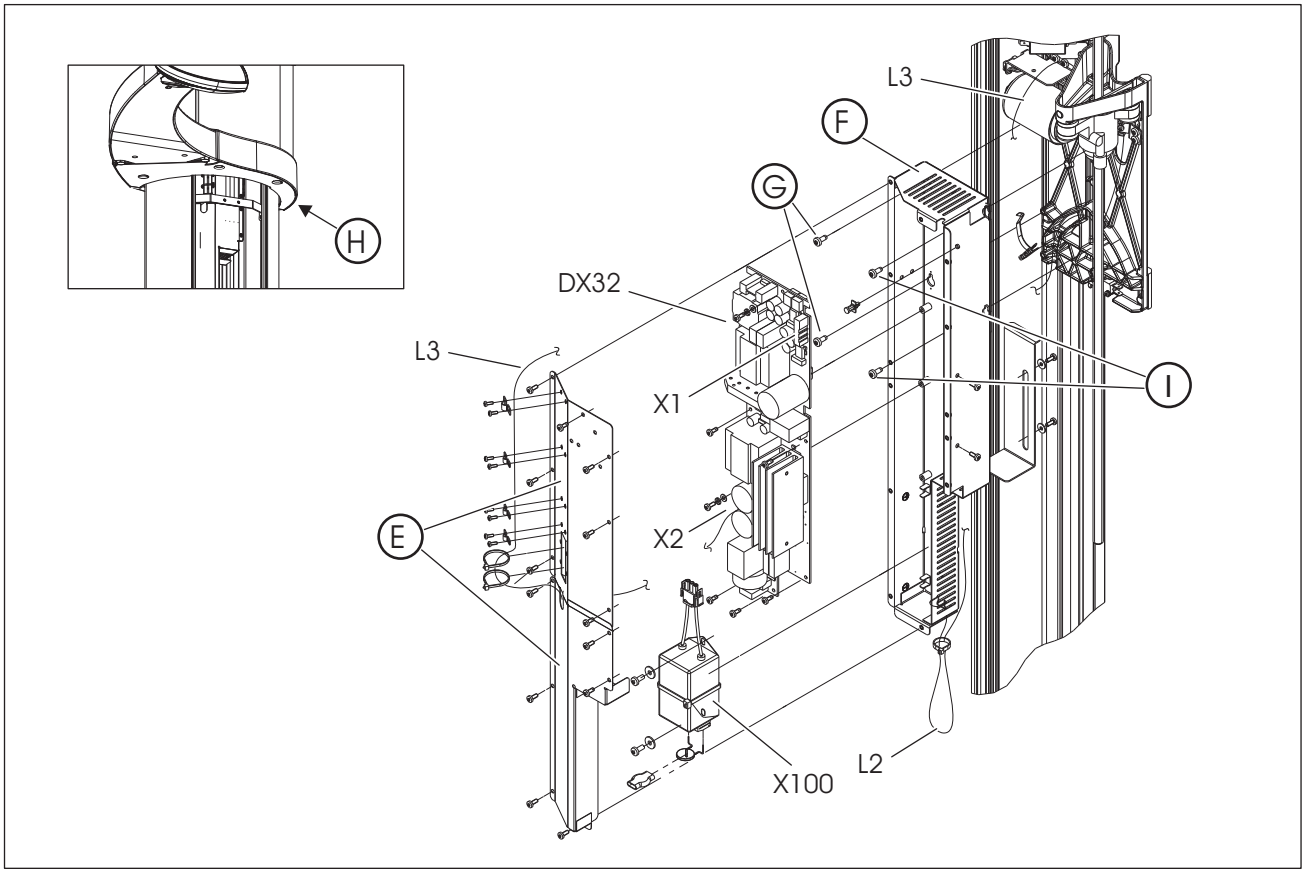
1. Unscrew the bracket (C) which is located in front of board **DX32**.
2. Move the stand to a height of 1260 (control panel display)
3. Disconnect the unit from the power supply system.

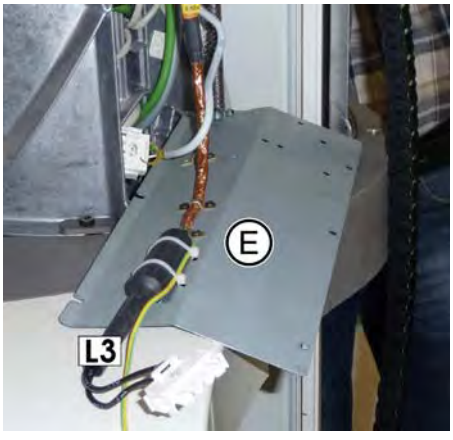


4. Remove the cable ties (A) from cable **L2**.



5. Loosen all the left-hand screws (B) of the protective plates (E).



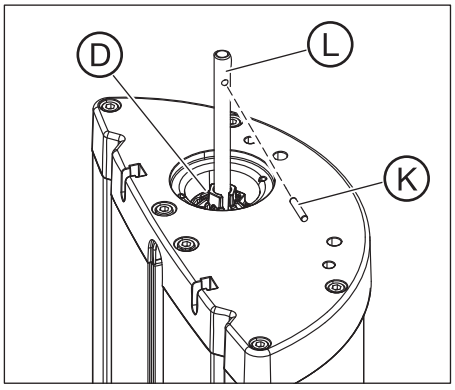


6. Unscrew the remaining screws from the protective plates (E).
7. Remove the covering plates (E) (top and bottom) from the connection box (F) of board **DX32**.
8. Cable **L3** can stay on the top covering plate (E) (remove any possible shield terminal).
   Tip: The covering plate can be folded away simply at the sides and put away in the stand sideways (to protect against scratches suitable padding should be put in between.).
9. Remove connector **X2** from board **DX32** and remove the protective conductor.
10. Remove cable **L2** from terminal **X100** and pull it downwards from out of the connection box (F).
11. Remove connector **X1** from board **DX32**.
12. Loosen the two left-hand screws (G).
13. Loosen the two screws on the right (I) and remove the connection box including board **DX32**.

9.2.3 Replacing the height adjustment motor/spindle

Removing the spindle

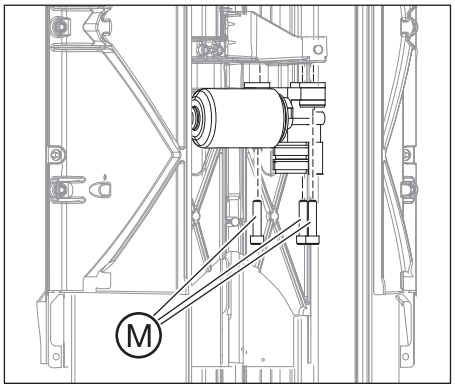
1. Loosen the two screws (**E**) on the spindle holder (**F**) (if you have not already done so) [→ 251].



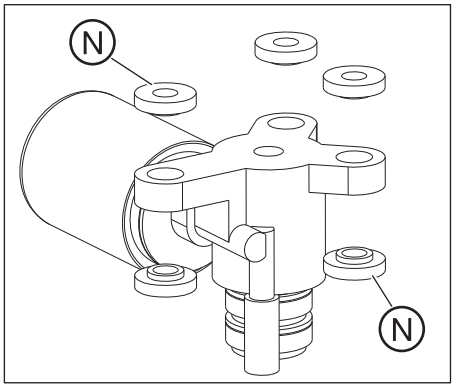
2. Turn spindle holder (**D**) (with an 18 mm A/F socket wrench) counterclockwise until the motor comes to rest on the limit stop and spindle (**L**) has been turned all the way out of the motor.
3. Remove the straight pin (**K**).
4. Remove the spindle (**L**).
   Tip: First, pull spindle (**L**) downward along the motor, and then diagonally upward and out of the unit.

Removing the defective motor

1. Pull the pulse generator cable connector **X402** off board **DX1**.
2. Detach the motor cable from the cable harness and carefully pull it out of the stand.
3. Pull the motor connecting cable off of the filter.
4. Loosen the three screws (**M**).
5. Remove the motor while carefully pulling the motor cable out of the stand.



Inserting the dampers



➢ Attach the new rubber pads (**N**) to the new motor.
They are included in the scope of supply of a new HA motor.

Installing the new motor

Install the height adjustment motor in the reverse order of removal.

Please observe the following:

Nuts: When fastening the motor, make sure that all three screws are tightened uniformly and protrude approx. 3 mm out of the nut.

Acorn nuts: If acorn nuts have been installed in the unit, turn the acorn nuts to the end stop.
CAUTION! Do not forget to reattach all connectors or cables, route them in their original position and reattach all cable ties and cable clamps.

Make sure that none of the cables are crushed by the cover plates of the DX32 connection box.

Final work

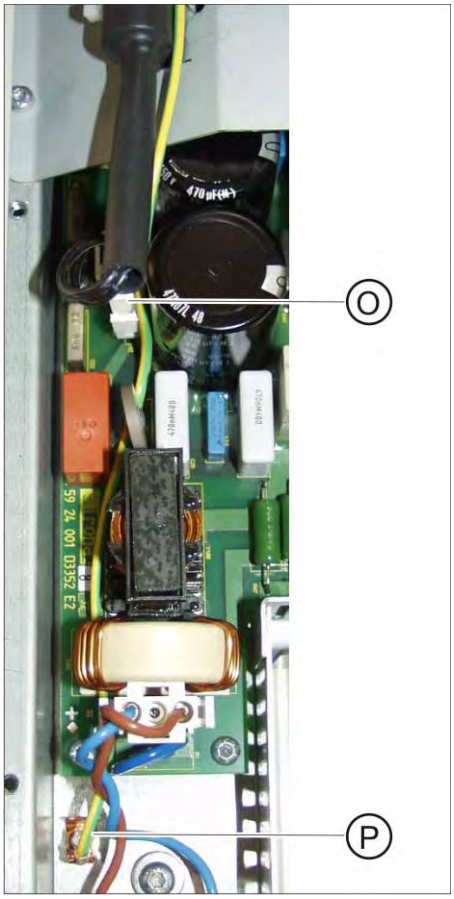
With the "height adjustment" service kit

1. After reinstalling the spindle, screw the first of the two screws (**E**) back into the spindle holder.
2. Then remove the locking pin and screw in the second of the two screws (**E**).
3. Attach the cover (**D**).
4. Remove the clamp (**A**).
5. Only then should you check the travel function of the slide.

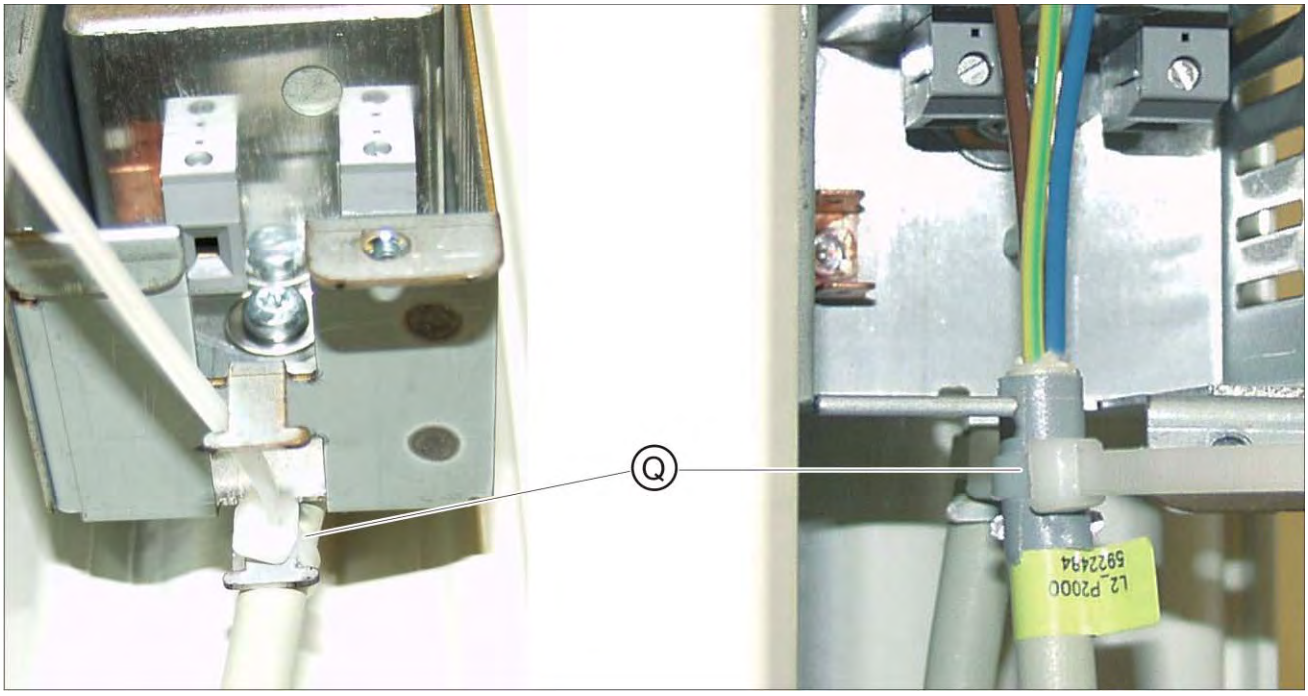
Without the "height adjustment" service kit

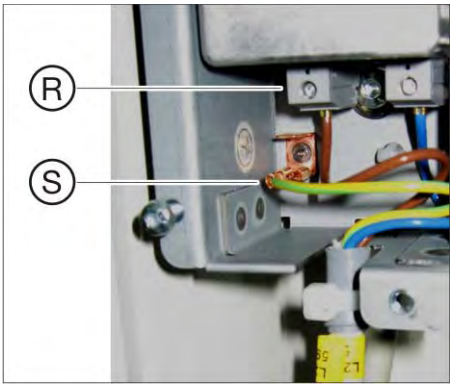
1. Attach the spindle holder (**F**) with the two screws (**E**).
2. Attach the cover (**D**).
3. Reattach the upper limit stop to the previously marked position.
4. Only then should you check the travel function of the slide.

9.2.4 Laying of cables when replacing the height adjustment motor

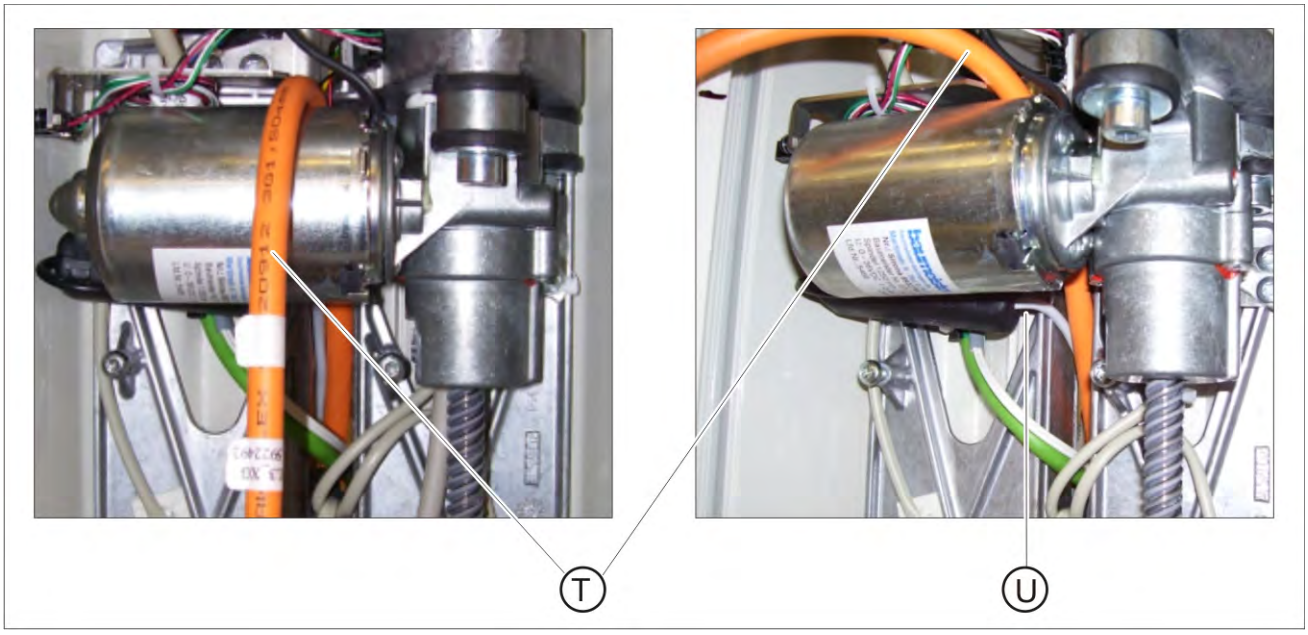


1. Plug connector **X2** (**O**) into board **DX32**.
2. Connect the protective ground wire (**P**) and lay it as shown in the photo.

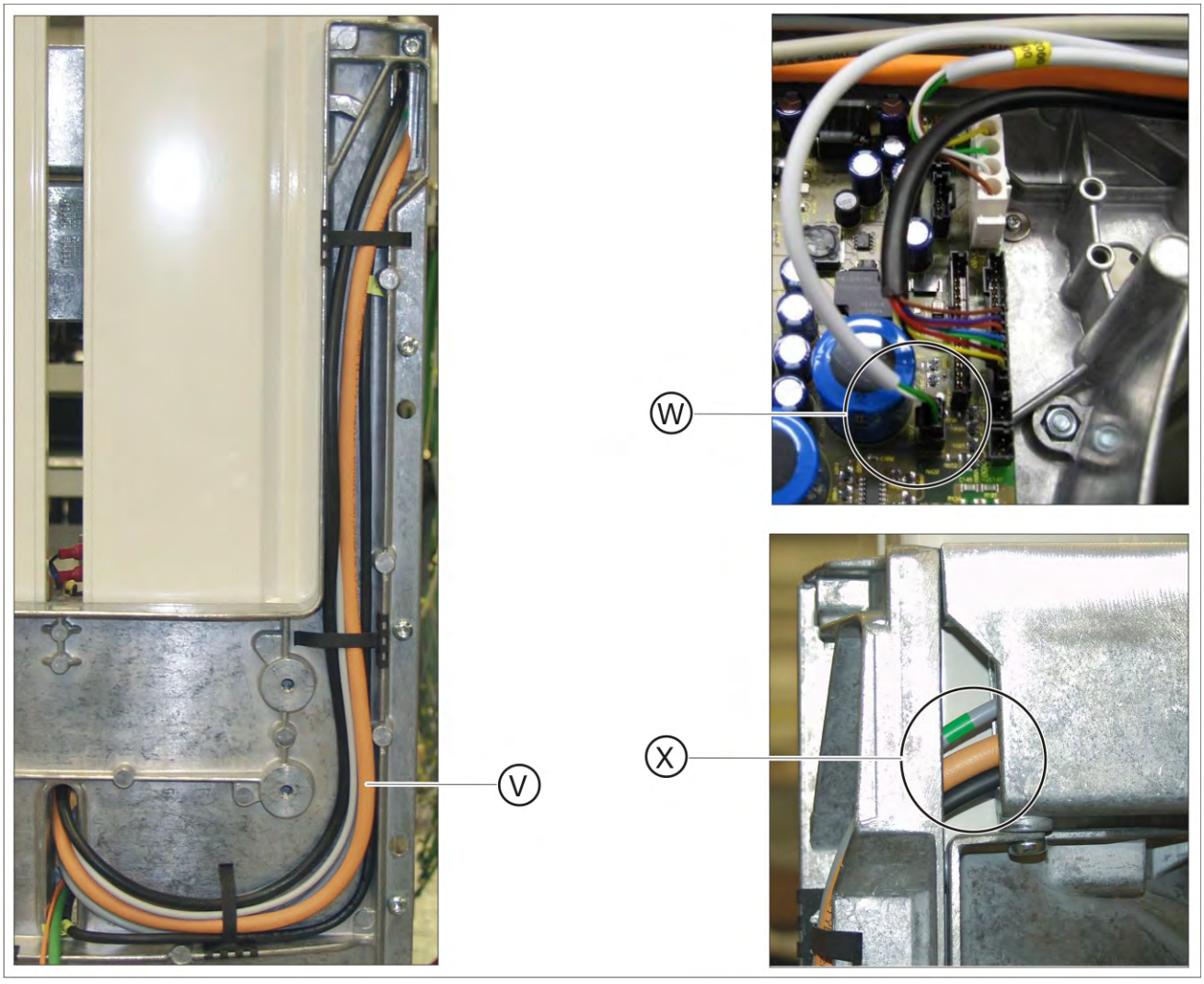




3. Attach cable **L2** first to the lower strain relief (photo on the left) and then to the upper strain relief (photo on the right) (**Q**) of board **DX32**.
4. Connect cable **L2** to board **DX32** (**R**) and attach the protective ground wire (**S**).



5. Run cable **L3** (**T**) and the motor cable (**U**) around the height adjustment motor.



6. Lay the motor cable in the cable harness (**V**) on the rear of the unit and secure in position with the cable clamps.
7. Route the cable into the arm.
IMPORTANT: The green mark must lie in the recess (**X**).
8. Plug connector **X402** (**W**) into board **DX1**.

9.2.5 What has to be done after replacing the height adjustment motor (M1_4) or the spindle?

1. After inserting the new spindle above and below the height adjustment motor, grease it thoroughly with Chesterton 622.
2. Use the Up/Down keys on the control panel to check the function of the height adjustment motor.
3. Reset the travel height.

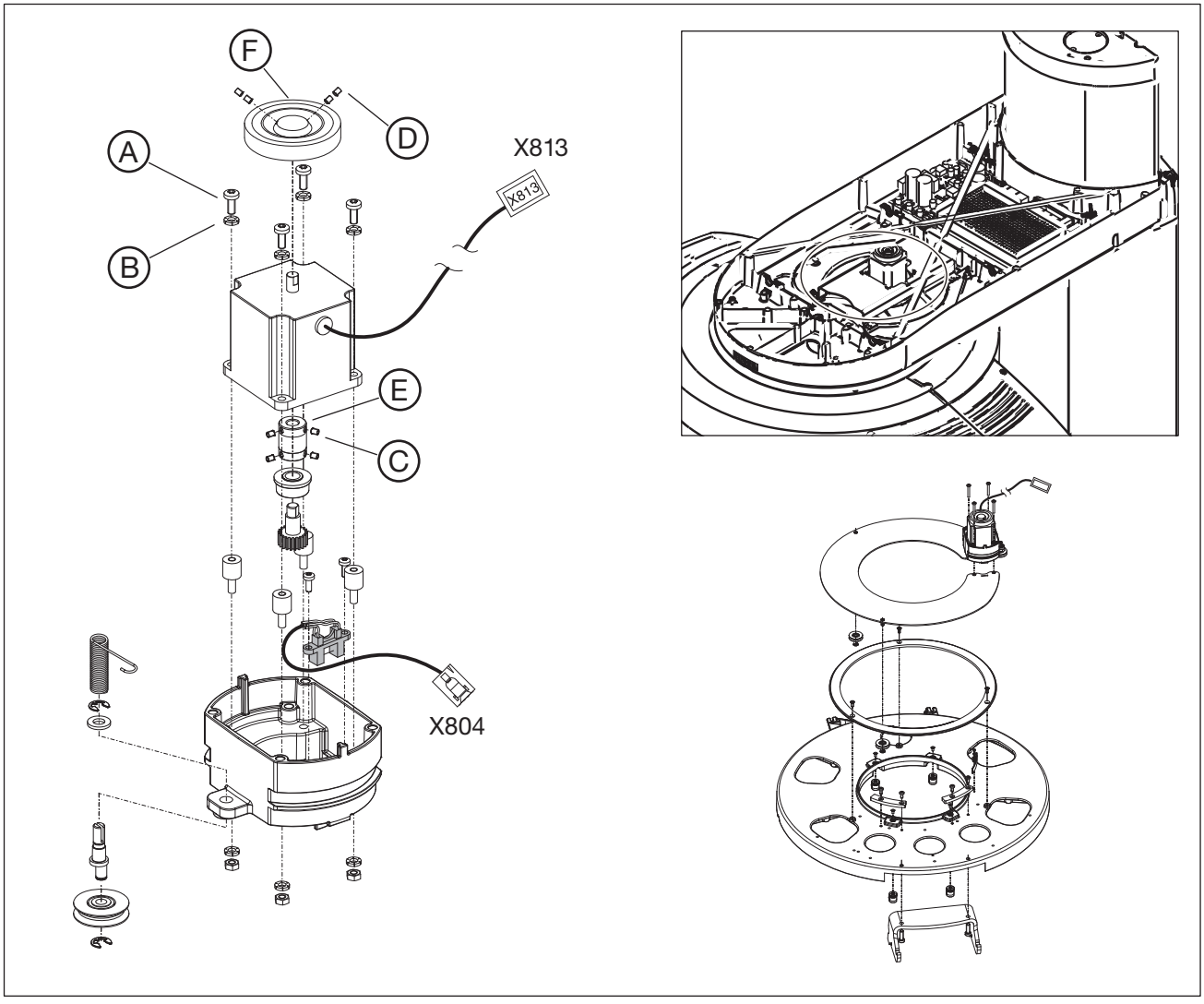
9.3 Ring motor (M1_3)

9.3.1 Replacing the ring motor

Removing the covers

➢ Remove the "arm cover".

Removing the defective motor



1. Detach the motor cable from the cable harness and pull it off of connector **X813** on board **DX1**.
2. Loosen the four screws (**A**) on the ring motor and remove the motor including the screws and the serrated washers (**B**).

Installing the new motor

1. Insert the new motor including coupling and absorber in the ring.
   Tip: While inserting the motor, turn it back and forth slightly until the pinion engages in the ring gear.
2. Use the screws (**A**) and serrated washers (**B**) to screw the new motor onto the motor support ring.

3. Run the ring motor cable along its original path and plug it back into connector **X813** on board **DX1**.
IMPORTANT: Don't forget to reattach all cable ties and clamps.

Attaching the covers

➢ Reattach the covers.

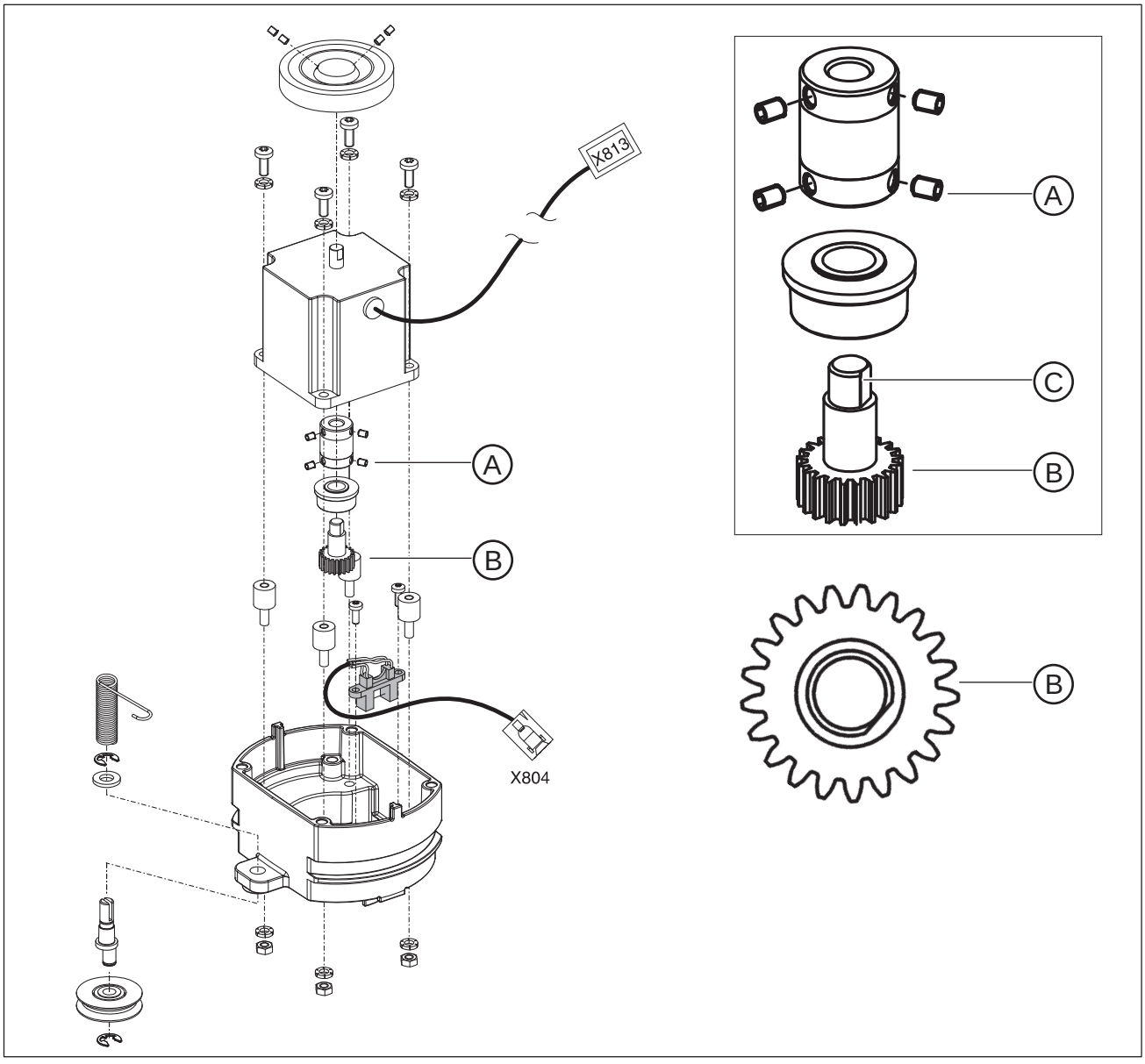
9.3.2 Replacing the pinion at the ring motor

Removing the covers

➢ Remove the "arm cover".

Removing the motor

➢ Remove the ring motor as described in the chapter Replacing the ring motor [→ 261] .



Replacing the pinion

1. Loosen the set screws (**A**) and pull off the defective pinion (**B**).
2. **IMPORTANT:** Ensure that the pinion is seated in the coupling so that the set screws (**A**) are sitting on the flattened surface (**C**) of the pinion

during subsequent tightening to prevent the pinion from turning.
Insert the new pinion.

3. **IMPORTANT:** Apply Loctite 242 to the set screws (**B**) before tightening.
   Retighten the set screws (**A**).

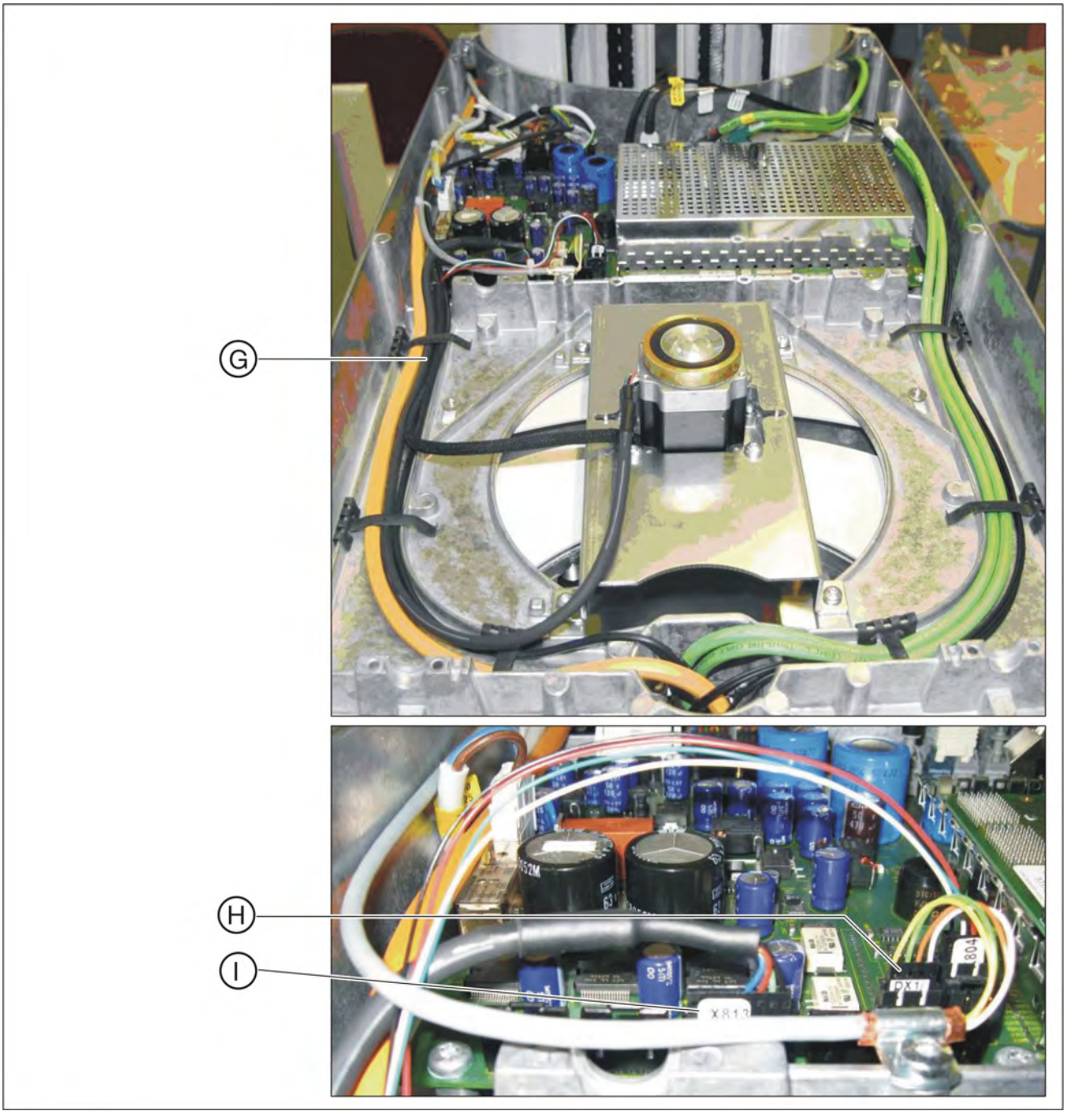
Installing the motor

➢ Reinsert the motor in the ring, route the cable and connect the motor as described in the chapter Replacing the ring motor [→ 261] .

Attaching the covers

➢ Reattach the covers.

9.3.3 Laying of cables when replacing the ring motor



1. Lay the cable (**G**) parallel to cable **L3** and secure it with the clamps.
2. Plug connectors **X804** (**I**) and **X813** (**H**) into board **DX1**.

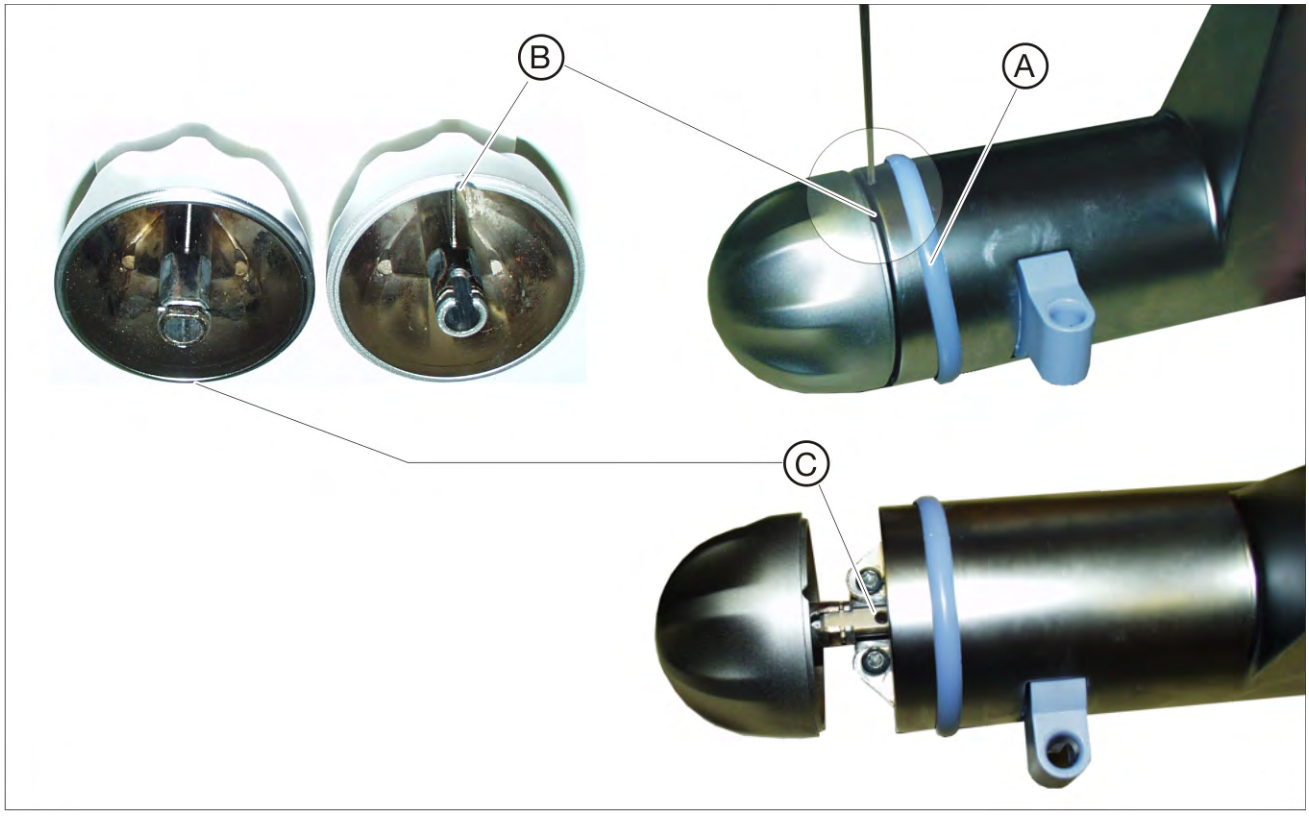
9.3.4 What has to be done after replacing the ring motor (M1_3)/pinion?

1. Check the function of the ring motor.
2. Perform complete unit adjustment or calibration [→ 145].

9.4 Rotary knob on the swivel arm

9.4.1 Replacing the rotary knob

Removing the rotary knob



1. Slide the plastic ring (**A**) toward the rear.
2. Turn the rotary knob and find the opening (**B**).
   If no opening (**B**) appears, you can now simply pull off the rotary knob.

or

➢ , if an opening appears: Loosen setscrew (**C**) with an Allen key (2mm).

3. Pull the rotary knob off.

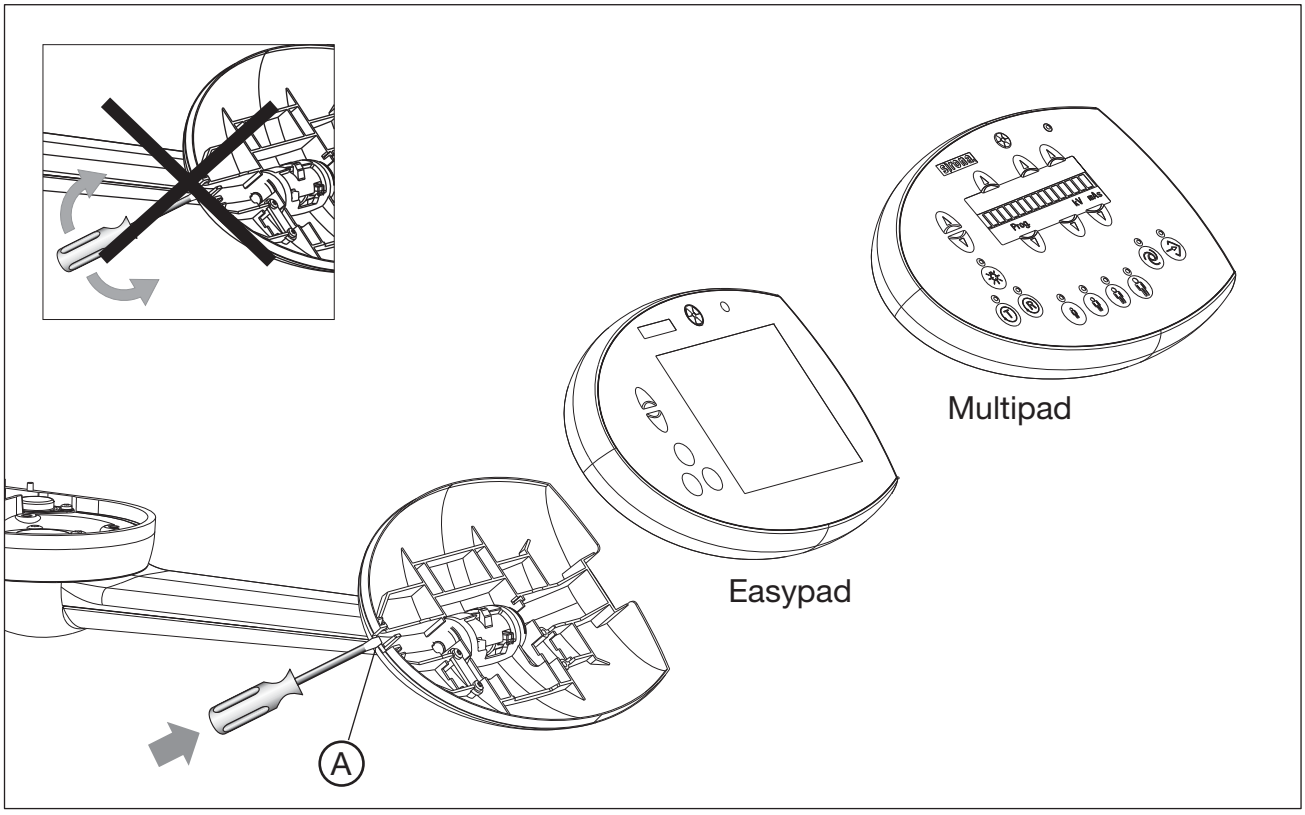
Attaching the rotary knob

Install the rotary knob by performing the steps above for dismantling in reverse order.

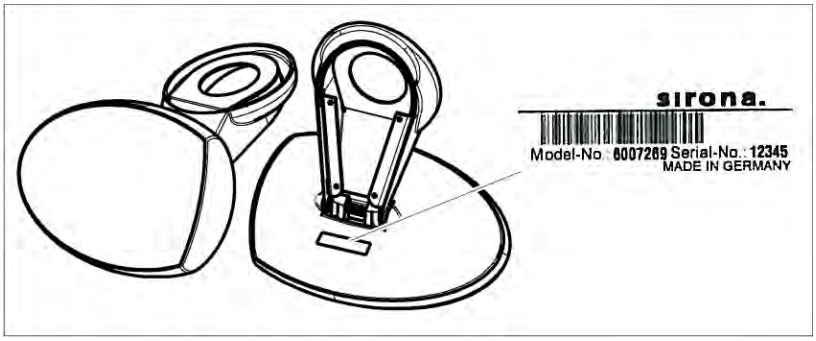
9.5 Control panel

9.5.1 Replacing Easypad or Multipad user interface

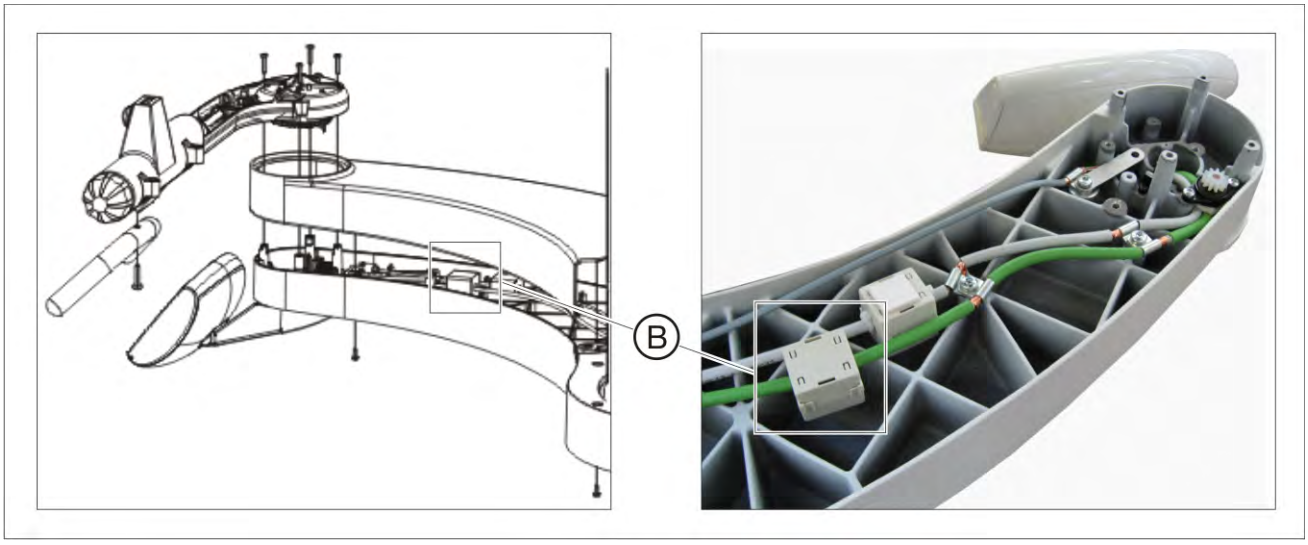
IMPORTANT
GALILEOS Compact: Multipad GALILEOS Comfort/GALILEOS Comfort^{PLUS}: Easypad



1. Press into slit (**A**) of the housing cover with a screwdriver (do not pry!) and remove the defective user interface from the control panel.
2. Pull cables **L9** and **L10** off of connectors **X102** (L9) and **X103** (L10) on board **DX7** (Easypad, "GALILEOS Comfort/GALILEOS Comfort^{PLUS}") or **DX71** (Multipad, "GALILEOS Compact") of the defective user interface.
3. Plug the cables into connectors **X102** (L9) and **X103** (L10) of board **DX7** (Easypad, "GALILEOS Comfort/GALILEOS Comfort^{PLUS}") or **DX71** (Multipad, "GALILEOS Compact") on the new user interface.
4. Clip the new user interface onto the control panel.



5. Update the nameplate at the control panel cover.
   To do so, affix the supplied label as shown in the figure.



6. **For "GALILEOS Comfort" (Easypad) only:** Cable **L10** (green cable) must be equipped with ferrite core (**B**), unless this has already been done.

9.5.1.1 What has to be done after replacing the user interface?

IMPORTANT: So that the board is also replaced with the user interface, you MUST also follow the instructions in the chapter titled "Measures following replacement of boards [→ 306]".

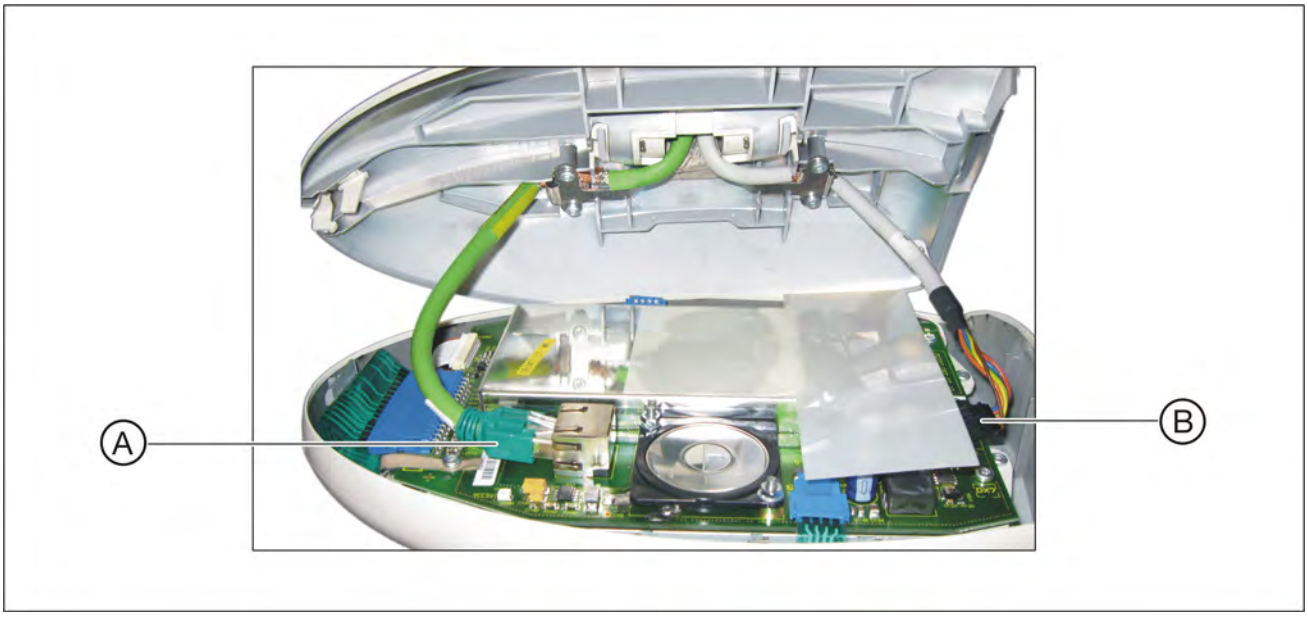
1. Check that the user interface and the display elements are functioning correctly: When the unit is switched on, all of the display elements must light up briefly.
2. Perform a software update to the latest version [→ 47].

Easypad only

Following replacement of the user interface, the language set on board DX7 is set to the factory setting by default (00 = German, English, French, Italian). If the configured unit language set (which can be queried by running service routine S017.5 or using the “extended detail query“ in SiXABCon) has a configuration other than 00, this configuration will be copied to board DX7 by the update function.

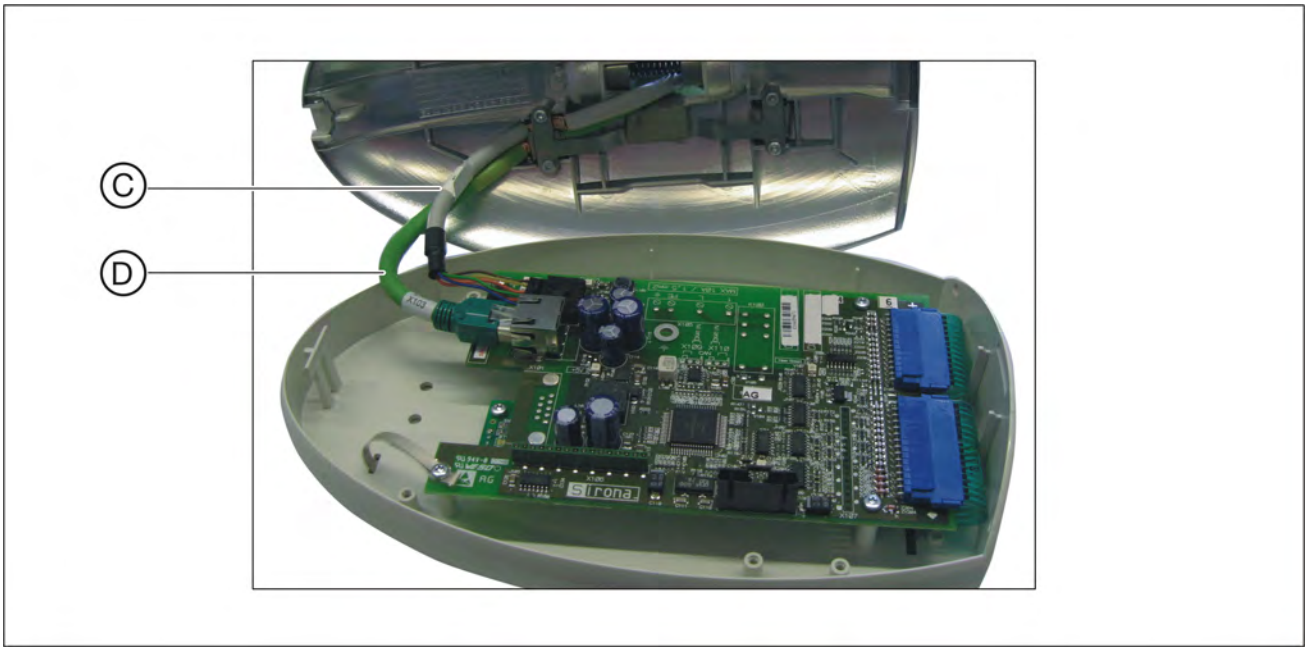
9.5.2 Laying of cables when replacing the user interface

Easypad



1. Plug the green cable **L10** (**A**) into connector **X103** on board **DX7**.
2. Plug the gray cable **L9** (**B**) into connector **X102** on board **DX7**.

Multipad



1. Plug the green cable **L10** (**D**) into connector **X103** on board **DX71**.
2. Plug the gray cable **L9** (**C**) into connector **X102** on board **DX71**.

9.6 X-ray tube unit

⚠ DANGER

Perilous shock hazard!

It is essential to switch the unit off and to wait at least another 4 minutes before starting the repair or taking off a cover panel!

IMPORTANT

Note compatibility between X-ray tube assembly and unit class

GALILEOS Compact/Comfort:
– X-ray tube assembly with Toshiba magnet bore DO 56 (0x02)
– X-ray tube assembly with Toshiba magnet bore D151R (0x03)

GALILEOS Comfort PLUS:
– X-ray tube assembly with Siemens magnet bore SR 120/15/60

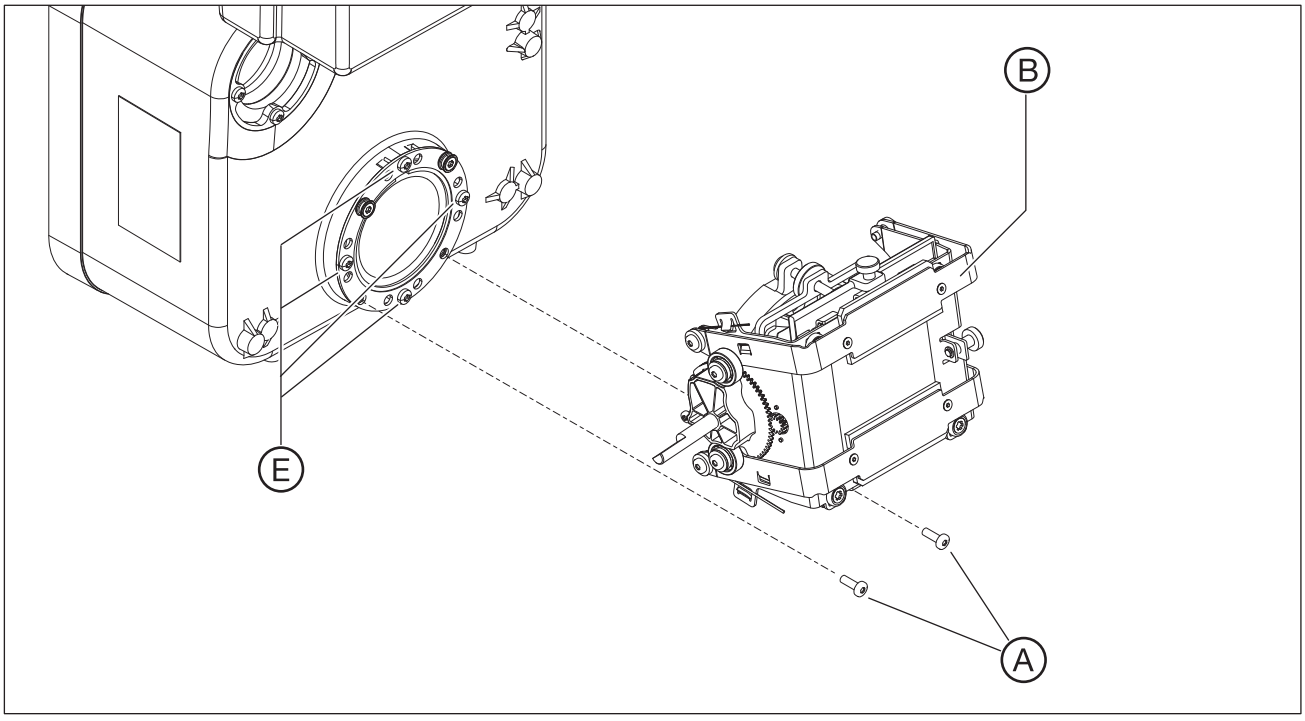
9.6.1 Replacing the X-ray tube assembly (GALILEOS Compact/ GALILEOS Comfort)

Removing the covers

1. Pull off the adjusting knob with the silicone ring.
2. Remove the "Tube assembly" and "Rear tube assembly" covers [→ 36].

Removing the diaphragm unit

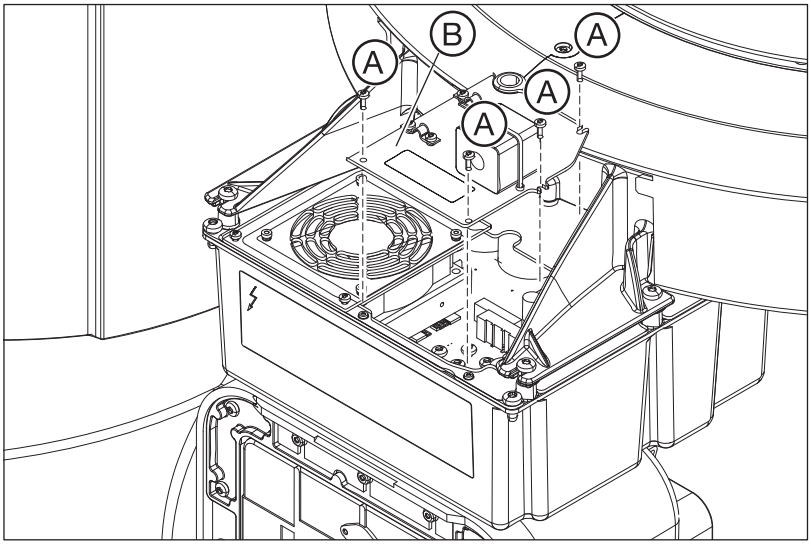
1. Turn the rotating element so that the tube assembly (as viewed from the front) is located on the right side of the unit (i.e. not above the swivel arm).



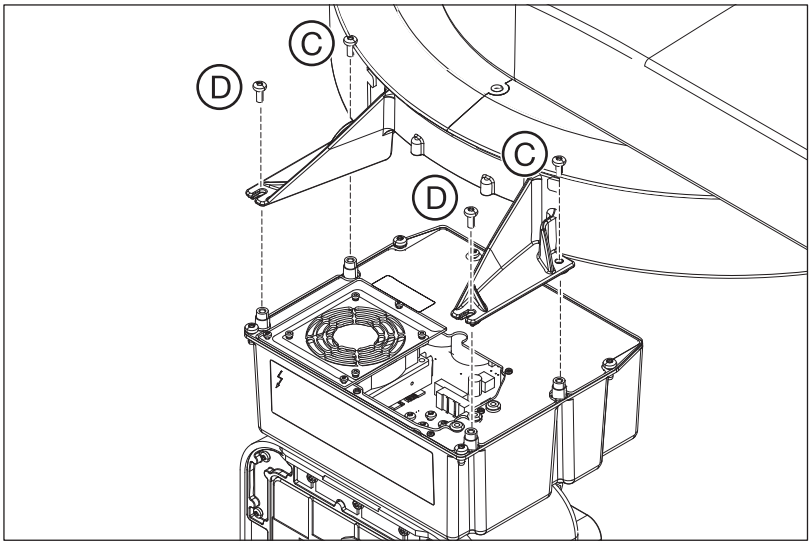
2. Loosen the two lower screws (**A**) (approx. 2 to 3 turns).

3. Push the diaphragm (**B**) upward and then toward the front.

Removing the defective X-ray tube assembly



1. Loosen the four screws (**A**) and remove cover plate (**B**) incl. the cable shielding (L3). Caution! Also pull cable **L3** off connector **X3** and the ground cable off connector **X304** on board **DX6**.
   Tip: The ferrite core and cable shielding can remain on the cover plate.
2. Detach cables **L5**, **L6** and **L15** from the rubber grommets and pull the cables off of sockets **J6** (L5), **J2-J3** (L6) and **J5** (L15) on board **DX6**.



3. Loosen the two rear screws (**C**) on the tube assembly.
4. **CAUTION! The tube assembly is heavy!**
   Hold the tube assembly firmly in place, loosen the two front screws (**D**) (3-4 turns) and remove the tube assembly toward the front.

Installing the new tube assembly

1. Hang the new tube assembly on the two front screws (**D**) of the rotating unit and tighten them securely.
2. Insert the two rear screws (**C**) and tighten them firmly.
3. Plug cables **L3**, **L5**, **L6** and **L15** as well as the ground cable back onto board **DX6** and reattach the cables to the rubber grommets.

4. Reattach the cover plate.

Installing the diaphragm unit

➢ To install the diaphragm, follow the procedure for removing it in reverse order.

IMPORTANT
Note the order for installing the filters! The image quality will be impaired if the filters are installed in the wrong sequence. Insert the aluminum filter (**D**) first, followed by the copper filter (**M**).

Attaching the covers

➢ Reattach the covers.

➢ **NOTICE! Do not force on the adjusting knob. Make sure the locking function of the adjusting knob works properly when setting the button in place.**
Set the adjusting knob in place with the silicone ring.

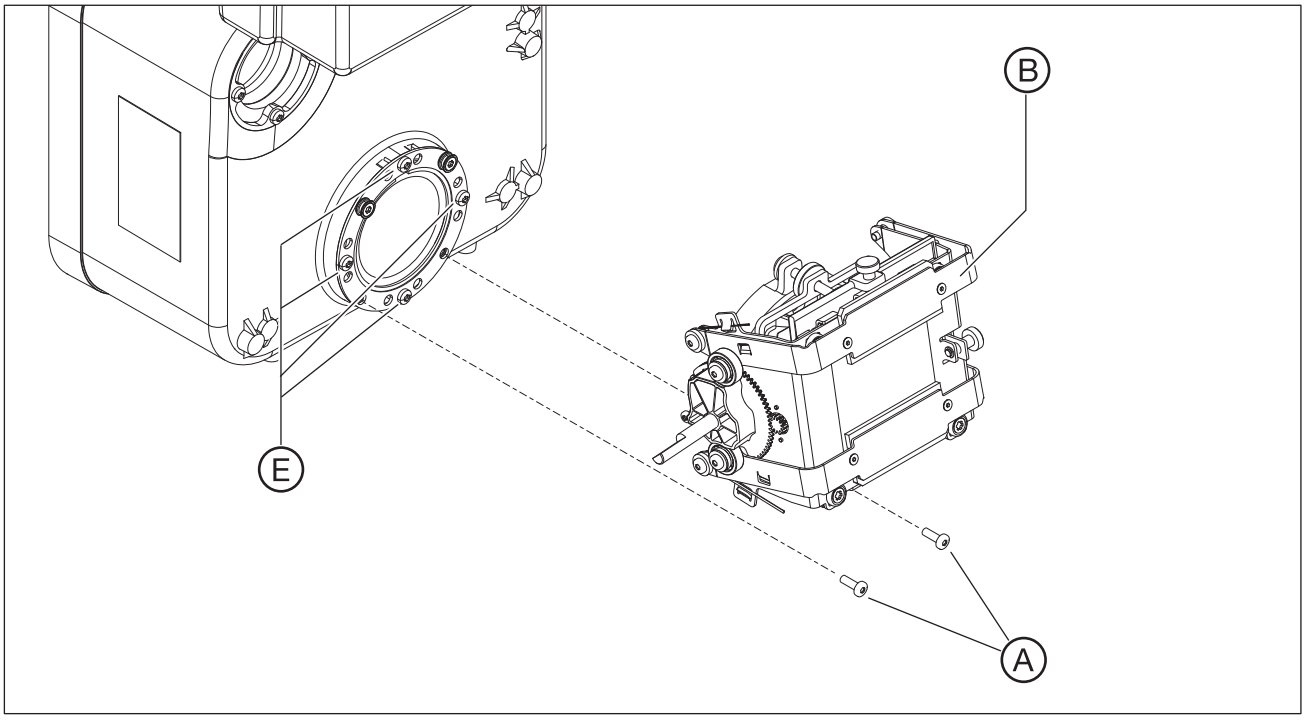
9.6.2 Replacing the X-ray tube assembly (GALILEOS Comfort PLUS)

Removing the covers

1. Pull off the adjusting knob with the silicone ring.
2. Remove the "Tube assembly" and "Rear tube assembly" covers [→ 36].

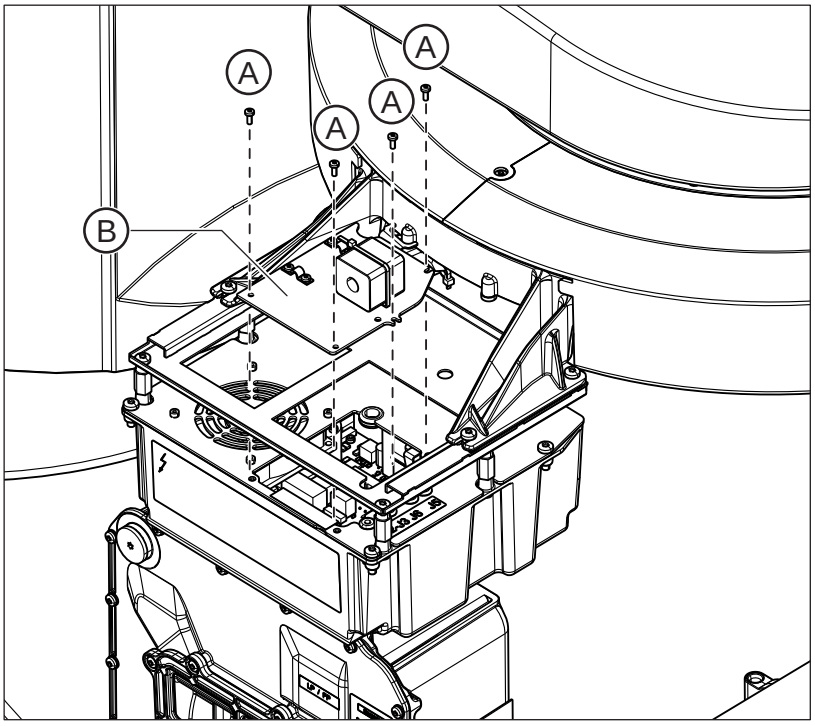
Removing the diaphragm unit

➢ Turn the rotating element so that the tube assembly (as viewed from the front) is located on the right side of the unit (i.e. not above the swivel arm).

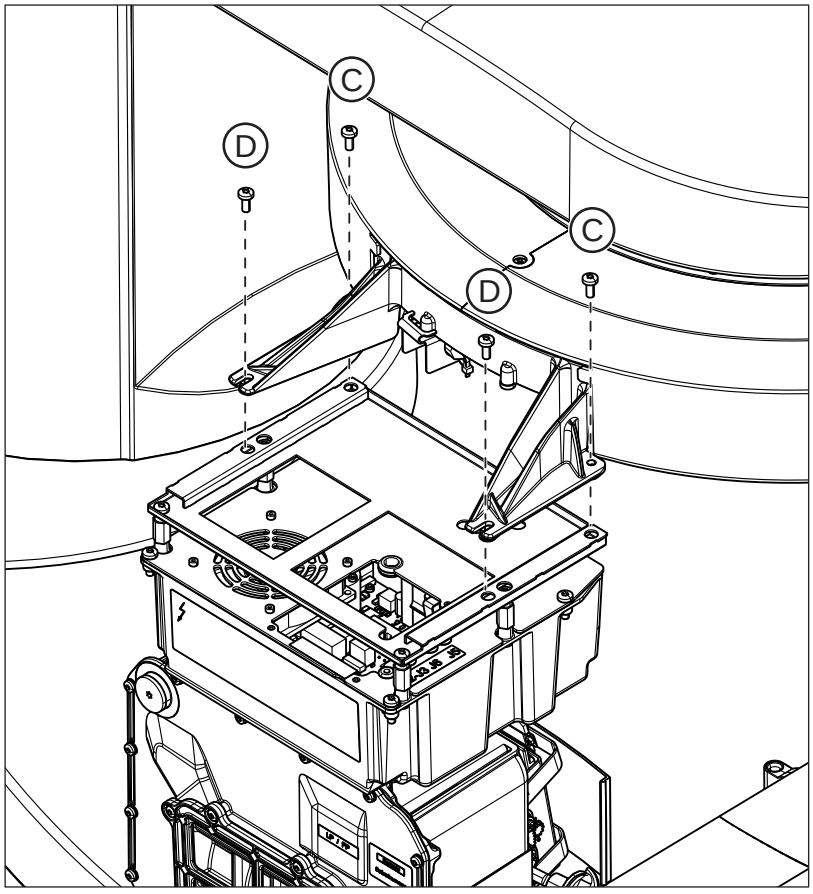


1. Loosen the two lower screws (**A**) (approx. 2 to 3 turns).
2. Push the diaphragm (**B**) upward and then toward the front.

Removing the defective X-ray tube assembly

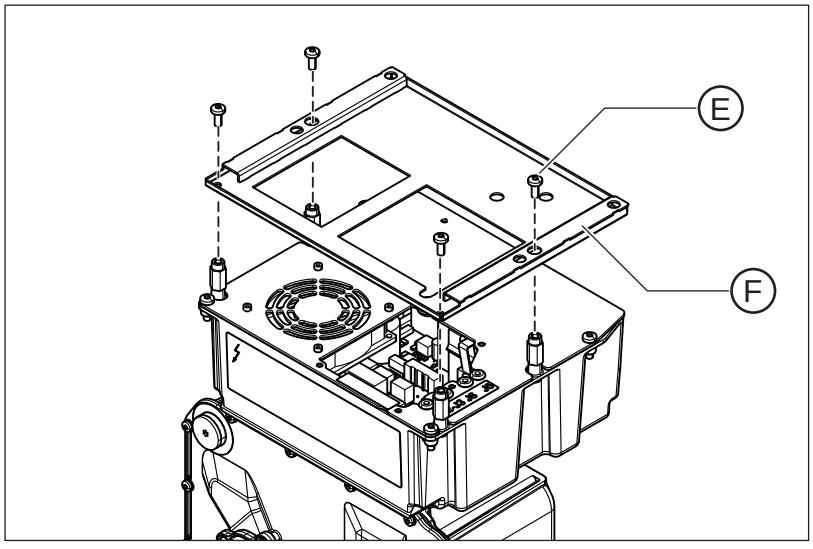


1. Loosen the four screws (**A**) and remove cover plate (**B**) incl. the cable shielding (L3). Caution! Also pull cable **L3** off connector **X3** and the ground cable off connector **X304** on board **DX6**.
   Tip: The ferrite core and cable shielding can remain on the cover plate.
2. Detach cables **L5**, **L6**, and **L15** from the rubber grommets and pull the cables off of sockets **J103** (L5), **J100-J101** (L6), and **J104** (L15) on board **DX6**.



3. Loosen the two rear screws (**C**) on the tube assembly.
4. **CAUTION! The tube assembly is heavy!**
   Hold the tube assembly firmly in place, loosen the two front screws (**D**) (3-4 turns) and remove the tube assembly toward the front.

Moving the cover plate



1. Loosen the four screws (**E**) and remove the cover plate (**F**) from the old X-ray tube assembly.
2. Install the cover plate on the new X-ray tube assembly.

Installing the new tube assembly

1. Hang the new tube assembly on the two front screws (**D**) of the rotating unit and tighten them securely.
2. Insert the two rear screws (**C**) and tighten them firmly.
3. Plug cables **L3**, **L5**, **L6** and **L15** as well as the ground cable back onto board **DX6** and reattach the cables to the rubber grommets.
4. Reattach the cover plate.

Installing the diaphragm unit

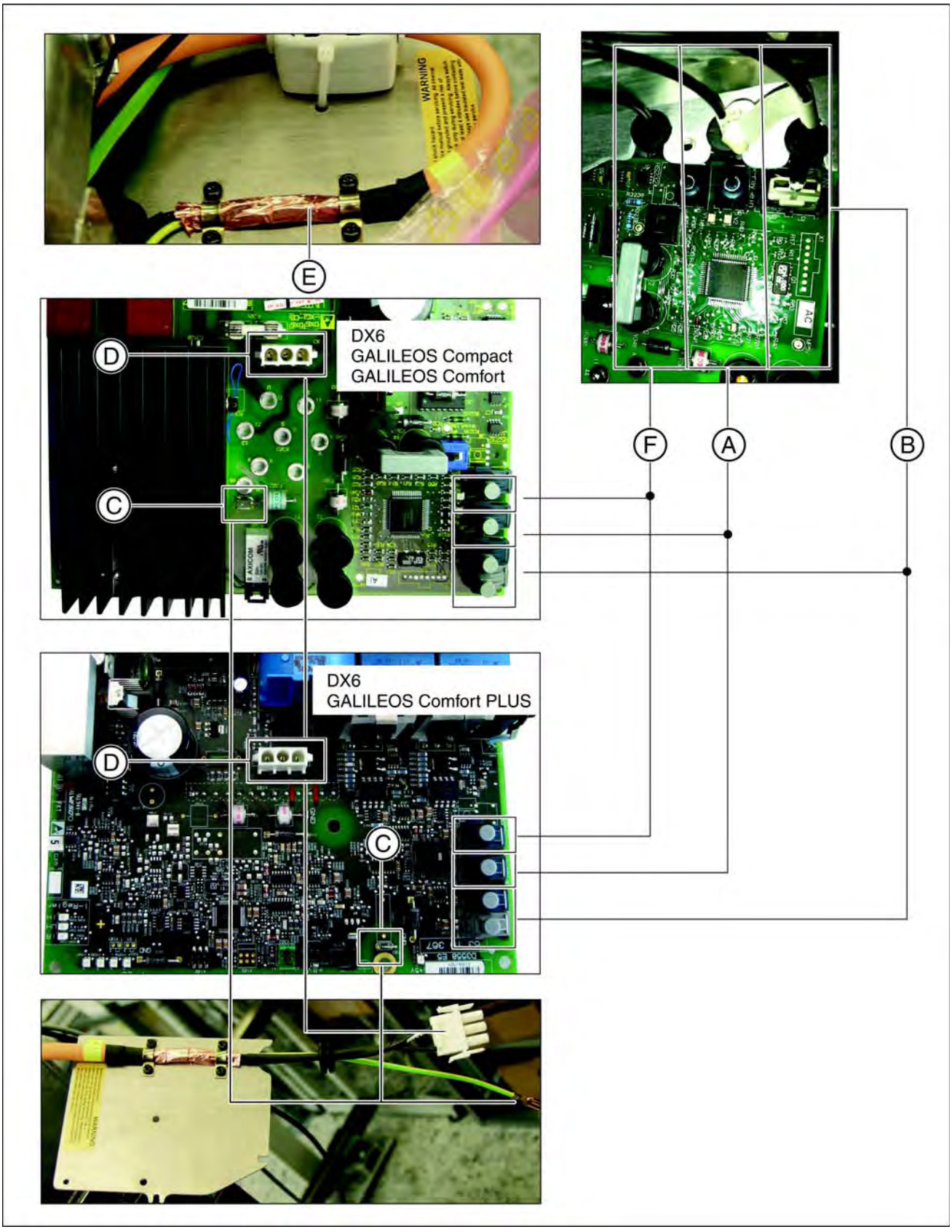
➢ To install the diaphragm, follow the procedure for removing it in reverse order.

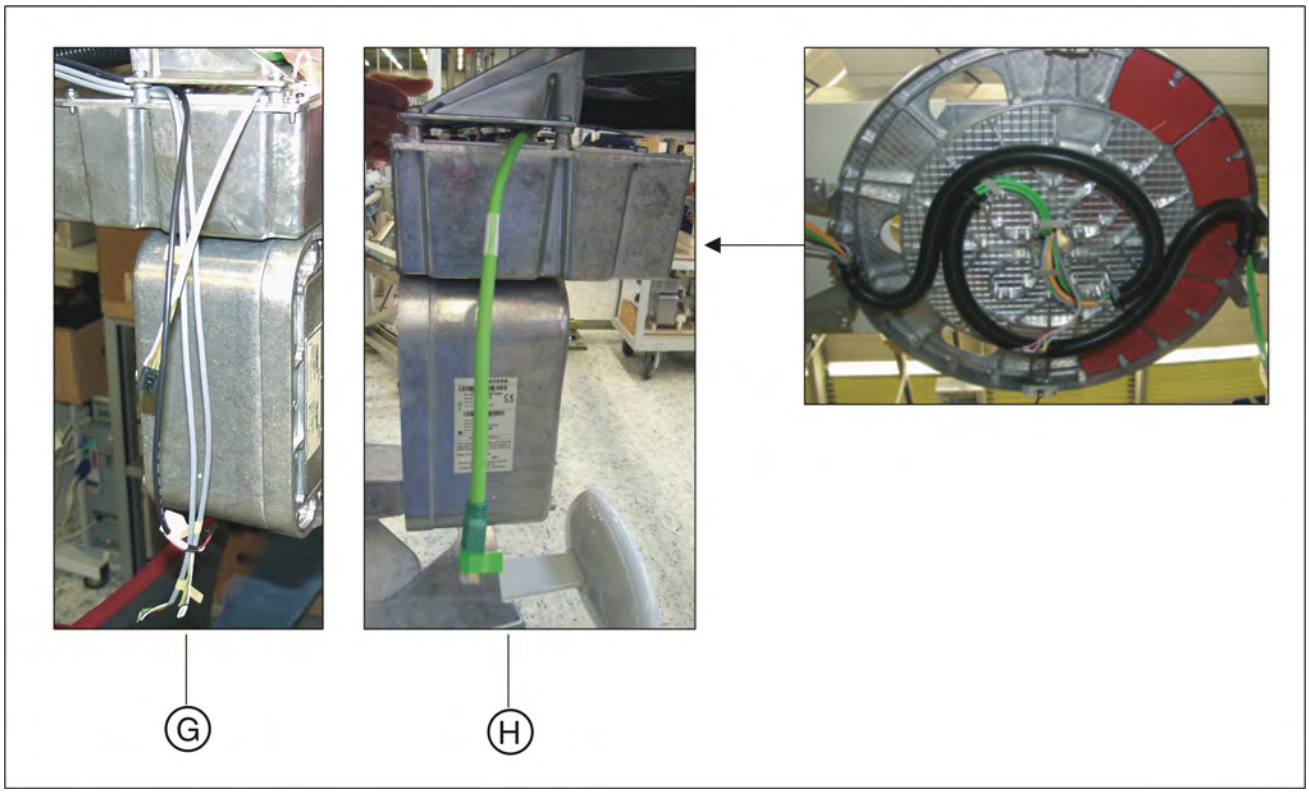
Attaching the covers

➢ Reattach the covers.

➢ **NOTICE! Do not force on the adjusting knob. Make sure the locking function of the adjusting knob works properly when setting the button in place.**
Set the adjusting knob in place with the silicone ring.

9.6.3 Cables and connectors for replacement of the X-ray tube assembly


WARNING
E
D
C
DX6
GALILEOS Compact
GALILEOS Comfort
F
A
B
DX6
GALILEOS Comfort PLUS
D
C



A	Cable L5 → Socket J6/J103 on board DX6
B	Cable L6 → Socket J2/J100 or J3/J101 on board DX6
C	Ground cable → Connector X304 (GALILEOS Compact or GALILEOS Comfort) or X103 (GALILEOS Comfort^{PLUS}) on board DX6
P	Cable L3 → Connector X3 on board DX6
E	Laying cables correctly on the cover plate
F	Cable L15 → Socket J5/J104 on board DX6
G	Cable routed on left side of tube assembly: 2x L21 and L20
H	Cable L12 routed on right side of tube assembly.

9.6.4 What has to be done after replacing the X-ray tube assembly?

IMPORTANT
Since board DX6 is also replaced with the tube assembly, you MUST also follow the instructions in the chapter entitled Measures following replacement of boards [→ 306].

1. Perform a complete unit adjustment or calibration [→ 145].
2. Perform an acceptance test (for Germany only) without calling in an expert.

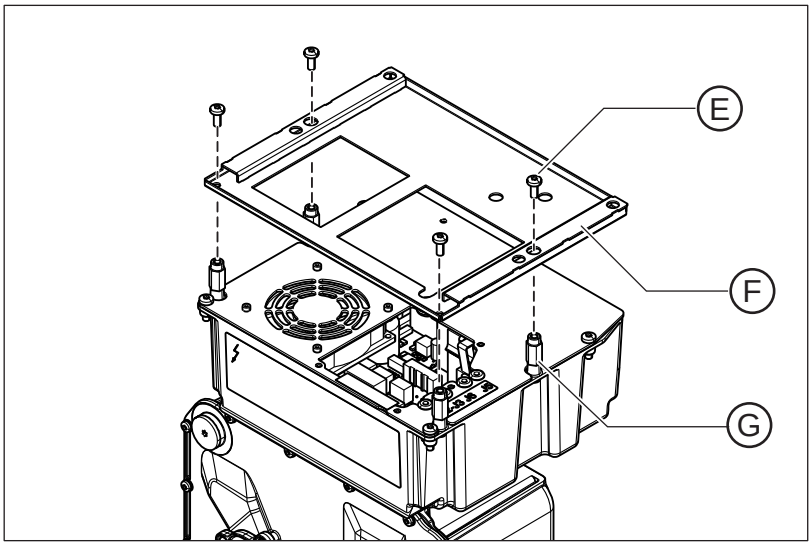
9.7 Fan (X-ray tube assembly)

9.7.1 Replacing the fan

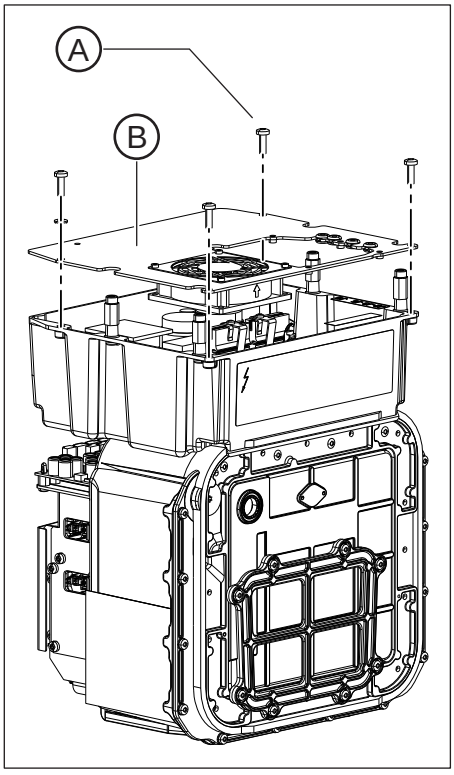
IMPORTANT

As the X-ray tube assembly has to be disassembled when replacing the fan, the unit must be fully readjusted (recalibrated) [→ 145] after replacing the fan.

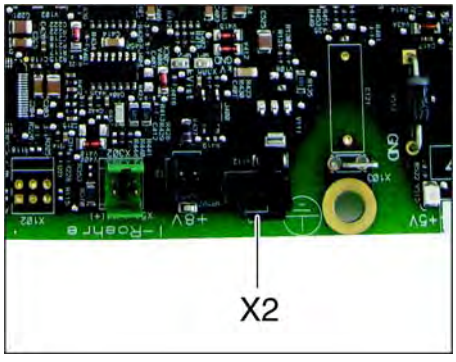
1. Disassemble the tube assembly.



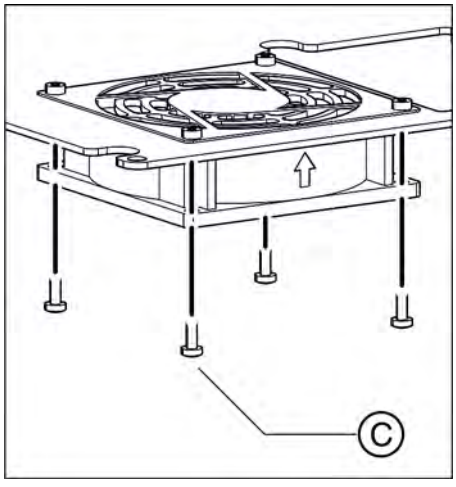
2. *Only for GALILEOS Comfort PLUS:*
   Loosen the four screws (**E**) and remove the cover plate (**F**).
   Unscrew the four spacers (**G**).



3. **NOTICE! Cable!** Loosen the four screws (**A**) and carefully remove the cover plate (**B**) including the fan.



4. Pull the fan cable off connector **X2** on board **DX6**.



5. Loosen the four screws (**C**) and remove the faulty fan from the cover plate.
6. Install the new fan, the cover plates, and the tube assembly following the dismantling procedure in reverse order.

9.7.2 What has to be done after replacing the fan?

Replacing the fan on tube assembly 1.0

➢ Check the function of the fan using service routine S005.4 [→ 193].

Replacing the fan on tube assembly 2.0

1. Check the function of the fan using service routine S005.4 [→ 193].
2. Perform a complete unit adjustment or calibration. [→ 145]

1. Check the function of the fan using service routine S005.4 [→ 193].
2. Perform a complete unit adjustment or calibration. [→ 145]

9.8 X-ray detector

IMPORTANT
For the GALILEOS Comfort PLUS, an X-ray detector with a serial number ≥ 6000 must be installed.

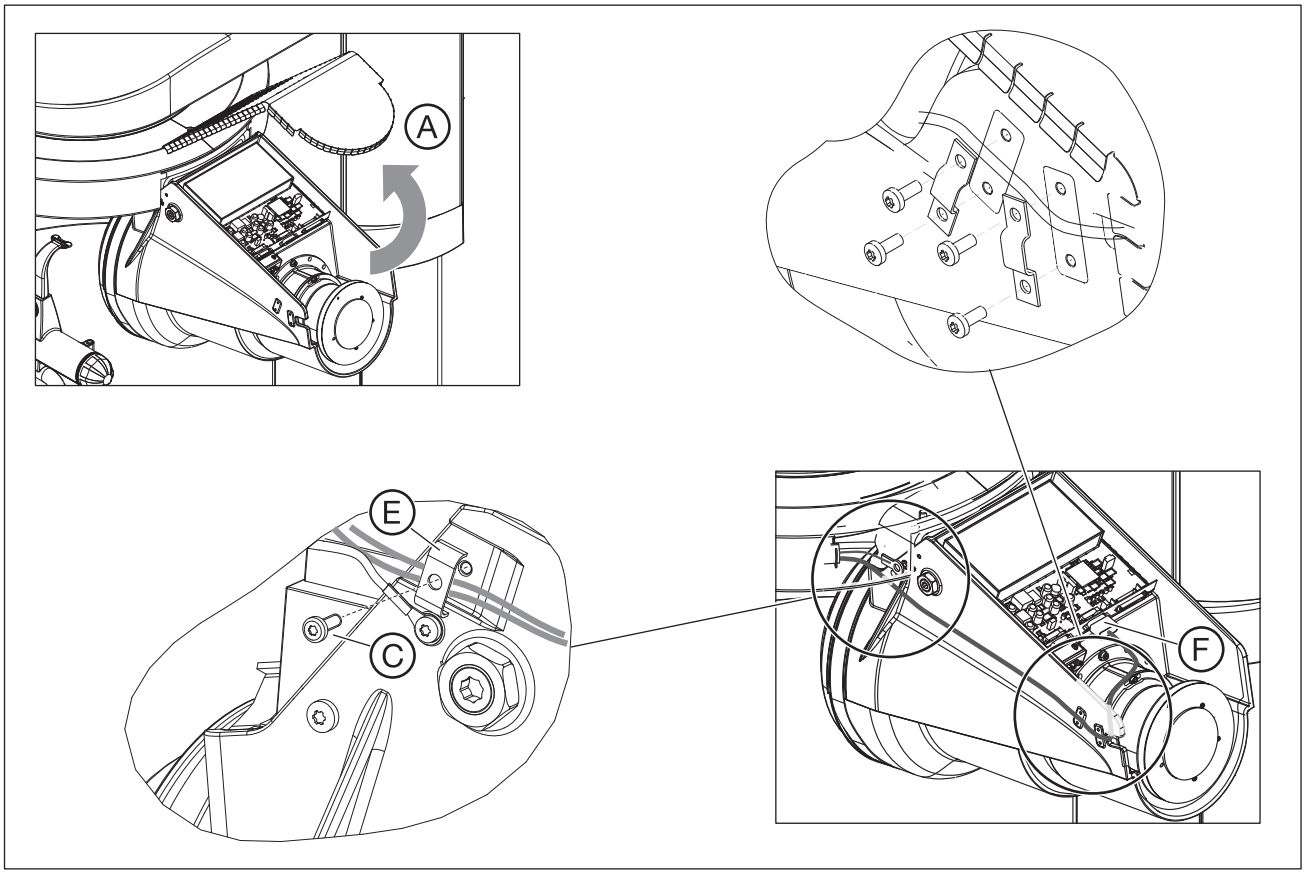
9.8.1 Replace X-ray detector

IMPORTANT
For FaceScan units: The FaceScan must be removed [→ 285] from units with FaceScan fitted before the X-ray detector can be replaced.

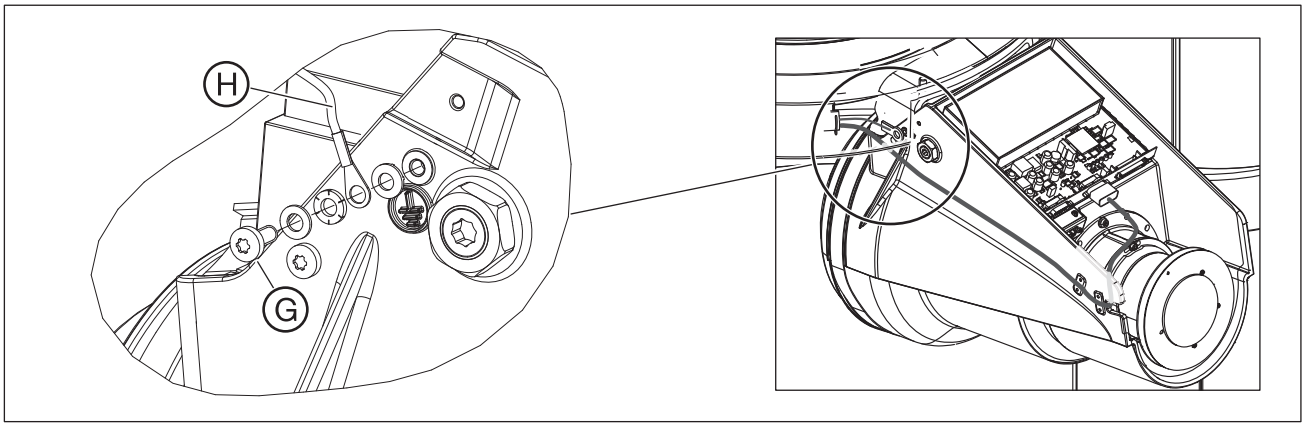
Removing the covers

➢ Remove the "x-ray detector cover".

Remove cable

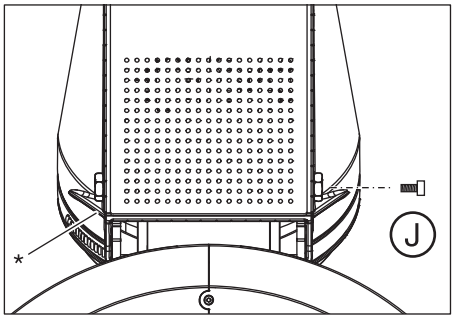


1. **CAUTION! Risk of injury! The cover plate may have sharp edges.**
   Carefully pull cover plate (**A**) upwards to remove it from the X-ray detector.
2. Loosen the screws (**B**) and (**C**), as well as clamps (**D**) and (**E**).
3. Remove cable **L13** from connector **X201** (**F**) on board **DX89**.



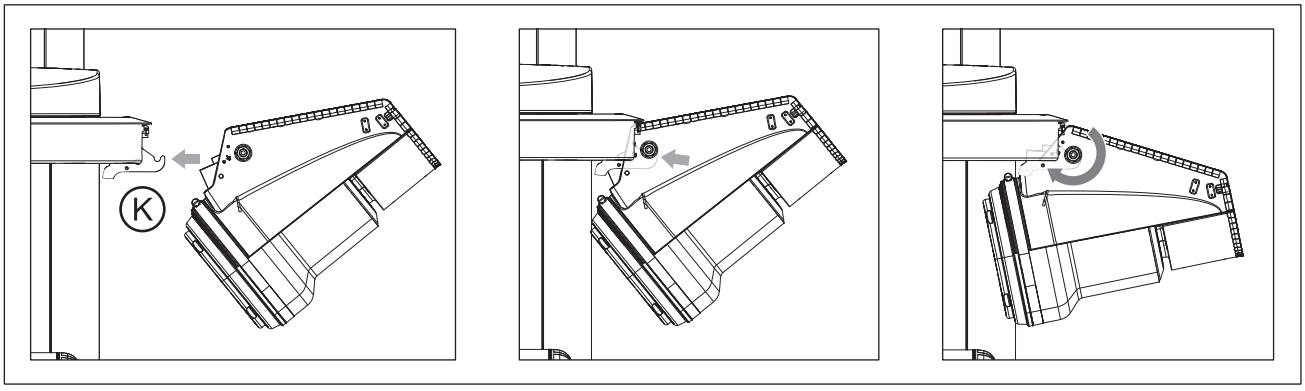
4. **NOTICE! Make sure that the grounding cable does not slip into the ring. Secure it with a cable tie or piece of adhesive tape if necessary.**
   Loosen screw (**G**) and disconnect the grounding cable (**H**).

Removing the X-ray detector

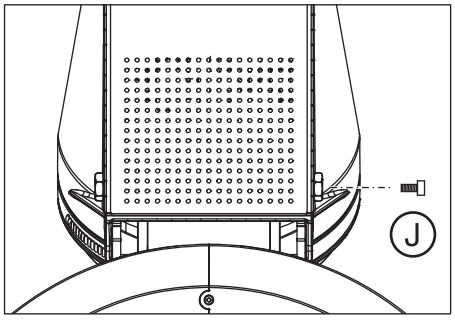


➢ **CAUTION! The x-ray detector is heavy!**
Loosen the screw (**J**), swing the X-ray detector slightly upwards and lift it out of the holder on the ring.
IMPORTANT: Depending on the unit hardware version involved, there may be a second screw located on the side opposite screw (**J**). If so, this screw(*****) must be loosened in order to remove the X-ray detector. This second screw does not have to be used during reassembly.

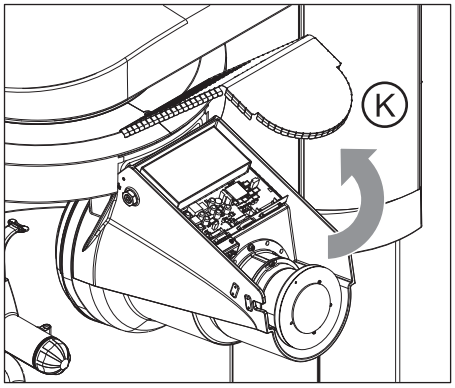
Installing the X-ray detector



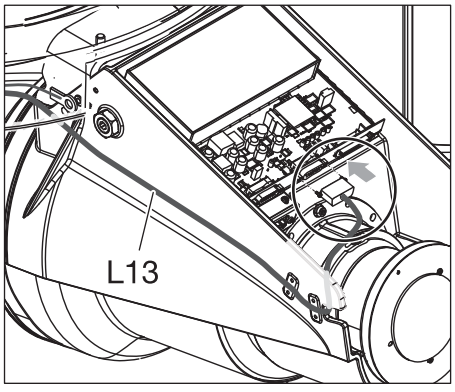
1. Hook the new x-ray detector into holder (**K**) from above, using the ring on the unit. The dead weight of the X-ray detector will cause it to tilt into the correct position.



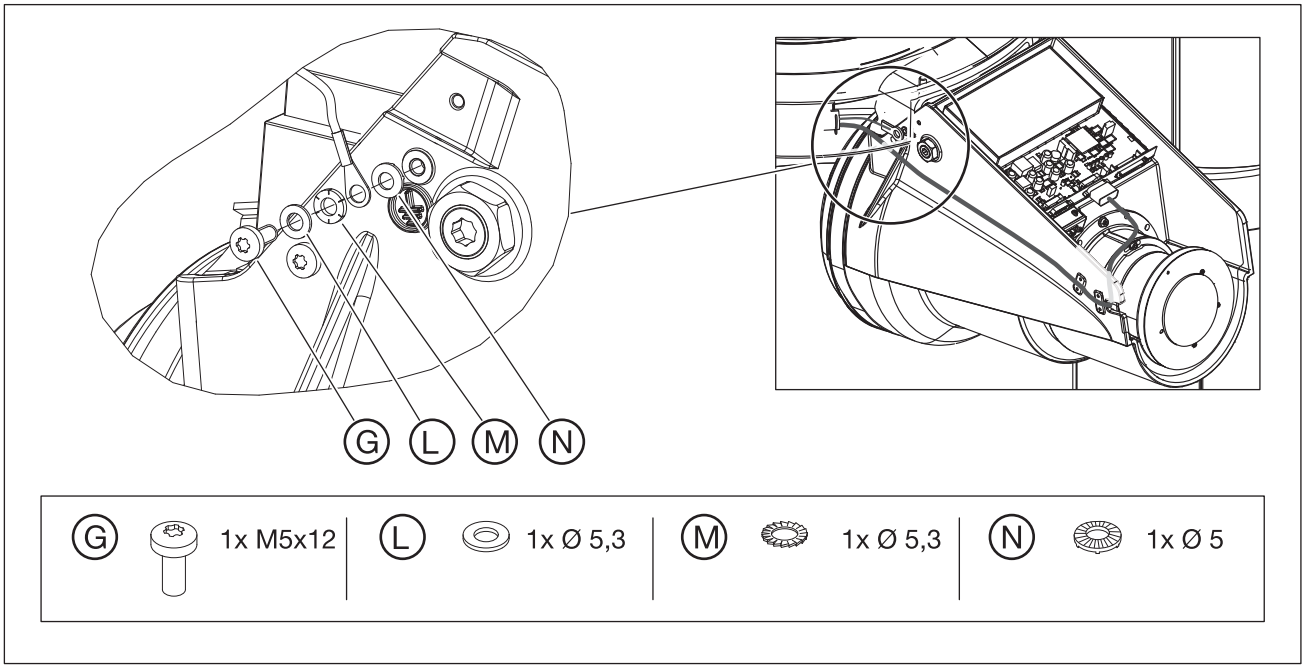
2. Secure it in place using the screw (**J**).



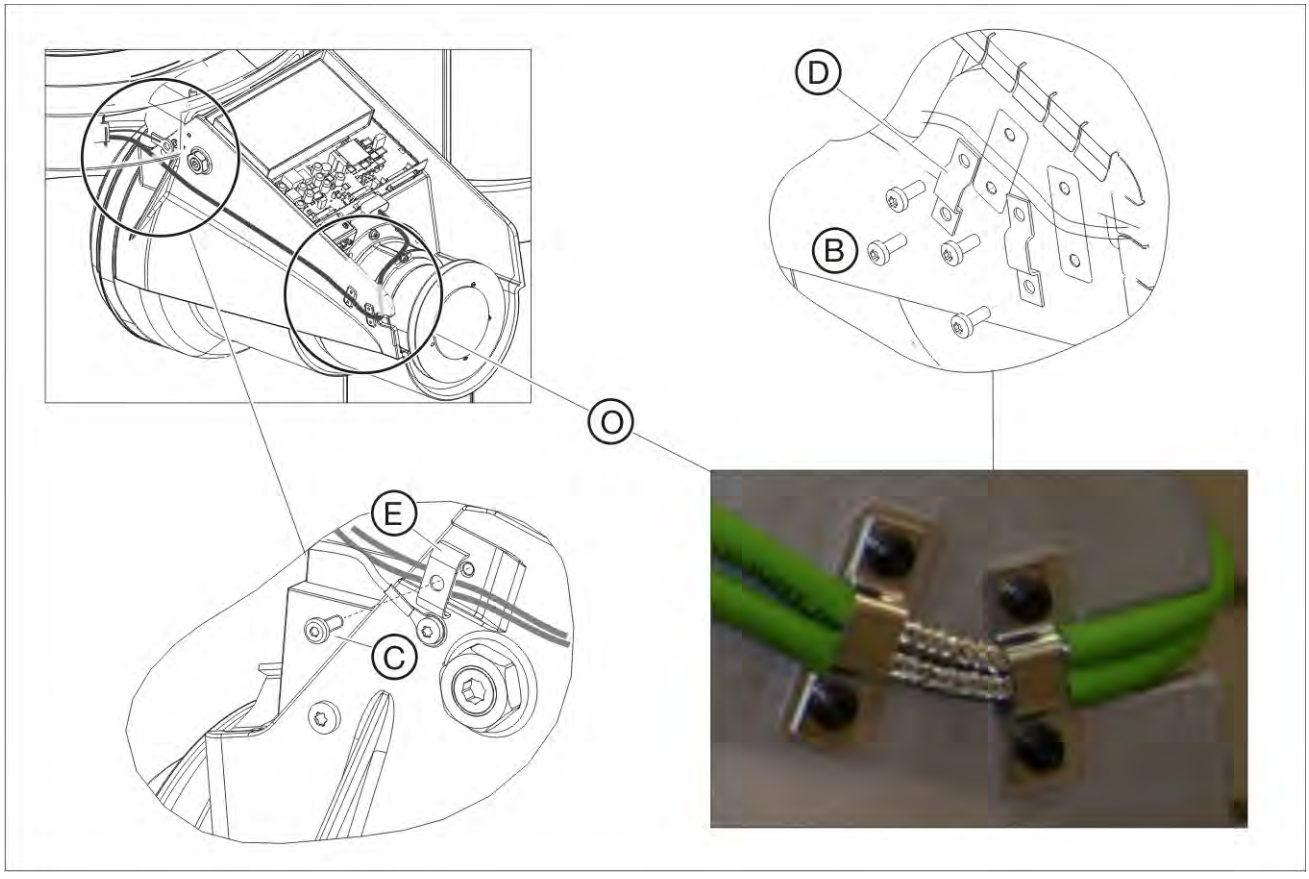
3. **CAUTION! Risk of injury! The cover plate may have sharp edges.**
Carefully pull the cover plate (**K**) upwards to remove it from the X-ray detector.



4. Plug cable **L13** (from the ring) onto connector **X201** on PCB **DX89** and use the two screws to secure it.



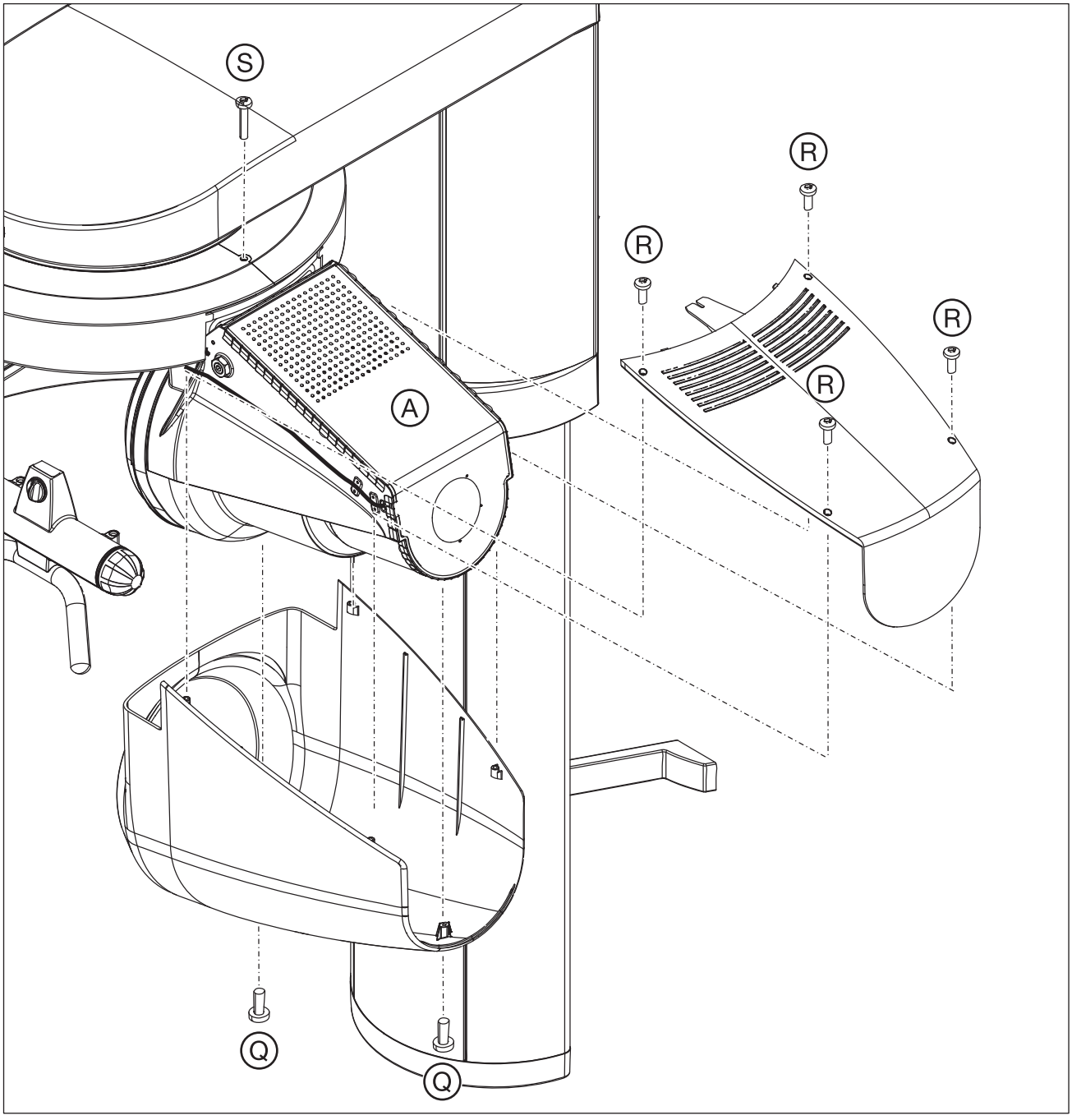
5. Connect the grounding cable from the ring with screw (**G**) as well as with washer (**L**), serrated washer (**M**) and contact washer (**N**).



6. **NOTICE! Ensure that cable L13 is correctly laid in the nut (O) of the X-ray detector.**

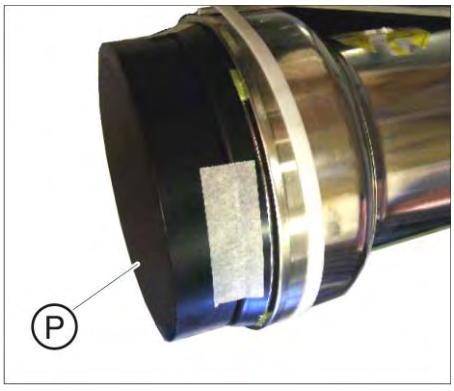
Route the cable **L13** as illustrated in the diagram, and attach the cover shielding on the X-ray detector housing using the 2 clamps (**D**) and screws (**B**).
Depending on the unit hardware version, the brackets on your unit may differ slightly from those shown.

7. Secure the cable with clamp (**E**) and screw (**C**).



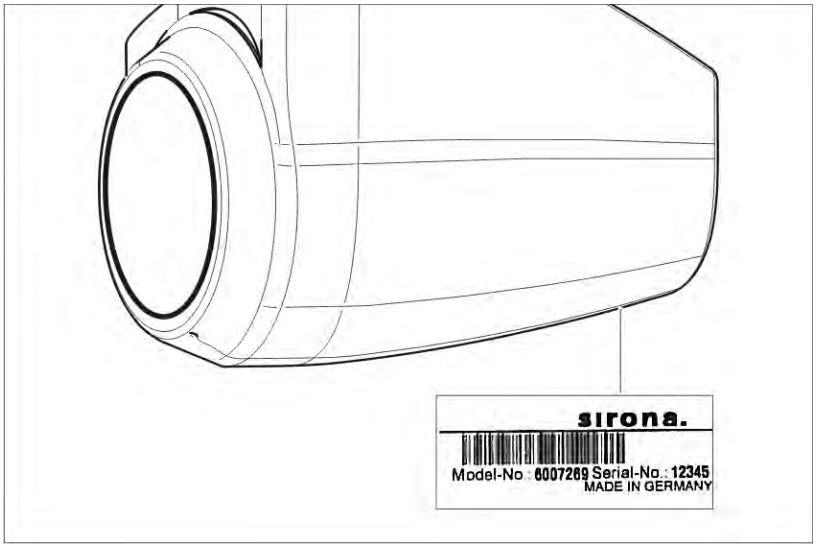
8. Re-attach the cover plate (**A**).

Attaching the covers



1. Remove the plastic cap (**P**) in front of the input window of the new X-ray detector.
   Depending on the hardware version of your unit, the plastic cap may differ slightly from the one shown in this diagram.
2. Use the two screws (**Q**) to attach the lower cover part to the X-ray detector.
3. **NOTICE! The tab on the upper cover part must be pushed underneath the ring cover.** Then place the upper cover part on the lower one and screw it tight using the four screws (**R**) as well as a fifth screw (**S**).

Updating the ID label



➢ Update the nameplate on the detector cover.
To do this, affix the supplied label as shown in the figure.

IMPORTANT
For FaceScan units: The FaceScan must be refitted [→ 287] on units with FaceScan fitted after the X-ray detector has been replaced.

9.8.2 What has to be done after replacing the X-ray detector?

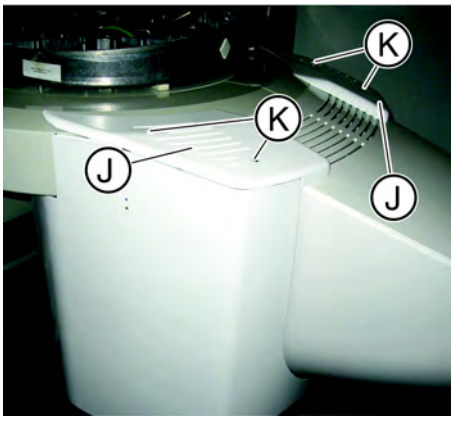
1. Perform a software update to the current main software version (V03.03.01 or higher) [→ 47].
2. Save the configuration data from board DX89 (to board DX11) via service routine S009.7 [→ 209].
3. Perform a complete unit adjustment or calibration [→ 145].

9.9 FaceScan

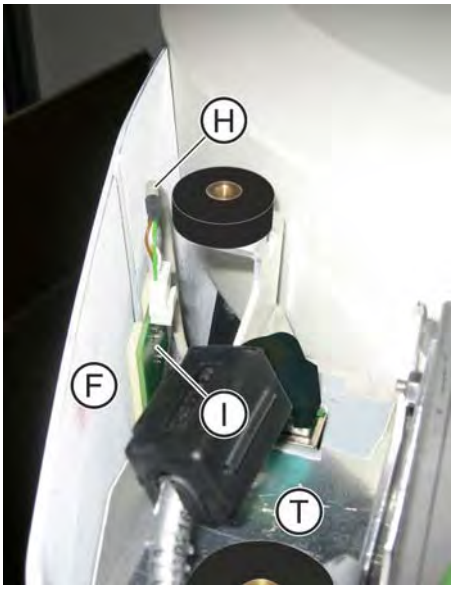
9.9.1 Replacing the scan unit

9.9.1.1 Removing the defective scan unit

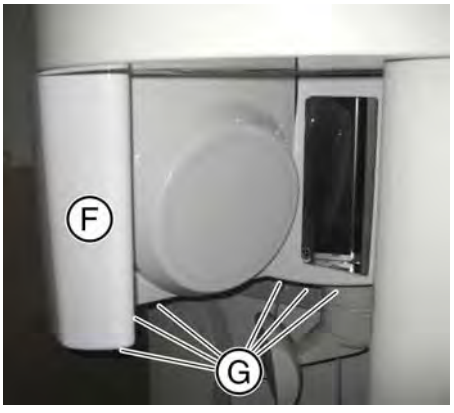
Removing the covers



1. Undo the four screws (K) and remove the two covers (J).

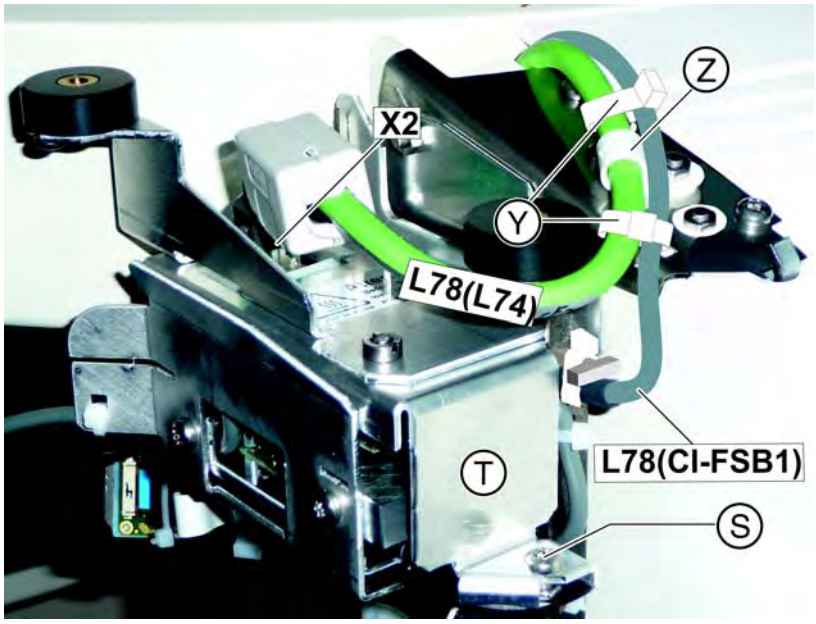


2. Disconnect the cable (H) from the display board (I) on the inside of the cover (F).

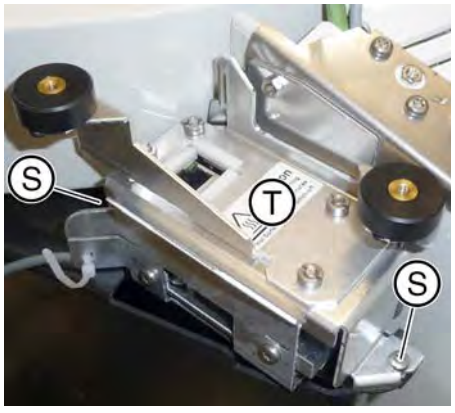


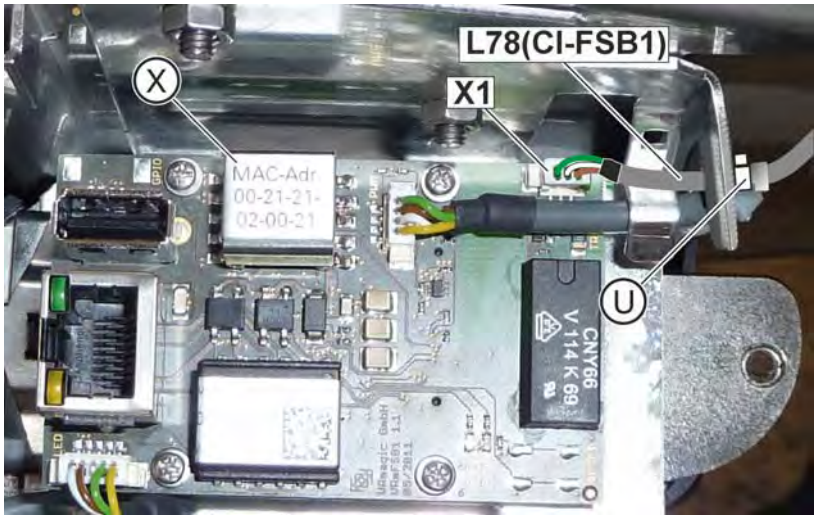
3. Undo the six screws (G) and remove the cover (F).

Disconnecting electrical connections



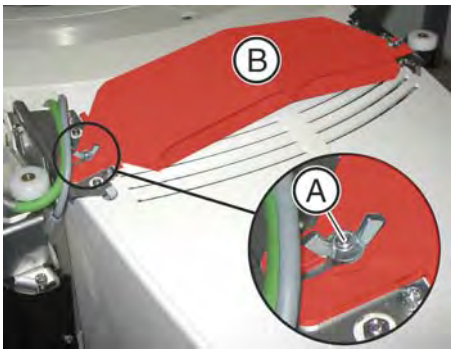
1. Disconnect cable **L78.3** from cable **L78.4**.
2. Remove the cable **L78.4** from the clamp (Z).
3. Pull cable **L78.4** from socket **X2** of the **FACESCAN** modular board.
4. Disconnect the gray cable **L78.3** from the chassis to the side.
5. Slacken the two screws (S) and remove the panel (T).
   ↳ The **FACESCAN** modular board is open.





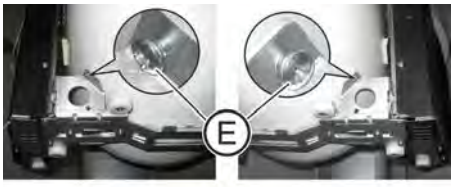
6. Pull gray cable **L78.3** from socket **X1** off the **FACESCAN** modular board.
7. Refit the panel (T) with the two screws (S).

Attaching the transport locks

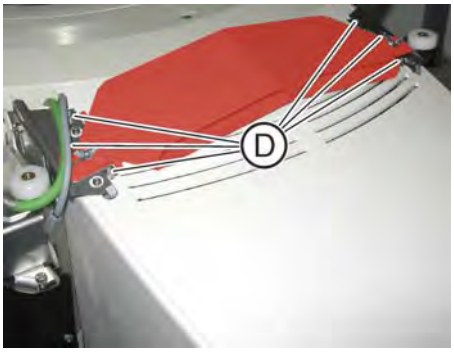


➢ Screw the transport lock (B) to the FaceScan using the wing screws (A) (for return shipping).

Removing the scan unit



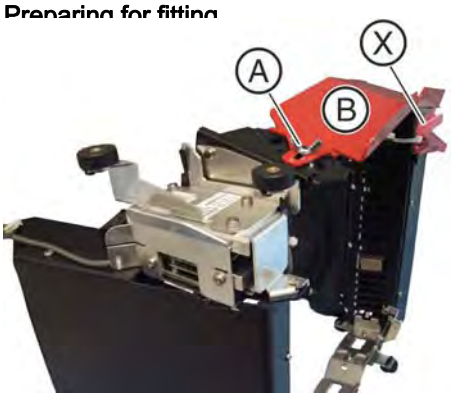
1. Unscrew the securing screws (E).



2. Unscrew the six screws (D) and detach the scan unit from the X-ray detector brackets to the rear.

9.9.1.2 Attaching new scan unit

Preparing for fitting



NOTICE

Risk of damage

Mechanical stress can cause damage to the scanning unit.

➢ For transporting and aligning the scan unit hold on to the transport lock (B) only.

1. Remove the bag (X) with the USB stick from the scanning unit.

NOTICE

Important data on the USB stick

The USB stick contains important data for starting up FaceScan.

➢ Store the USB stick in a safe place.
➢ **Do not** delete any data from the USB stick.
➢ Do not copy any **external data** to the USB stick.

2. Loosen **one** wing nut (A) of the transport lock (B).

NOTICE

➢ Do **not** remove the wing nuts.

Attaching the scan unit

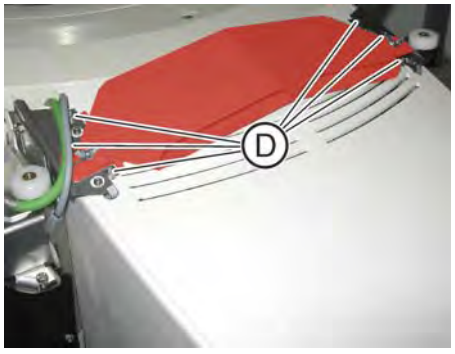
IMPORTANT

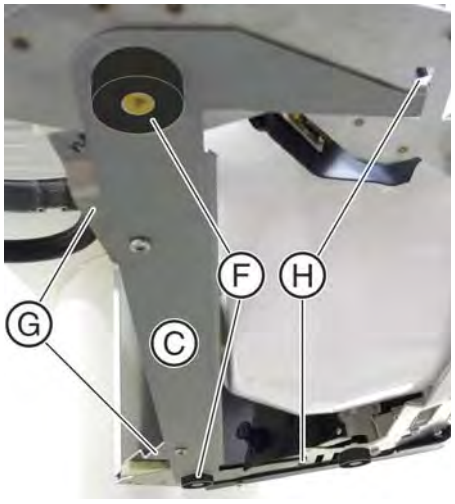
Risk of damage

When hanging the scan unit, the housing of the X-ray detector can get scratched.

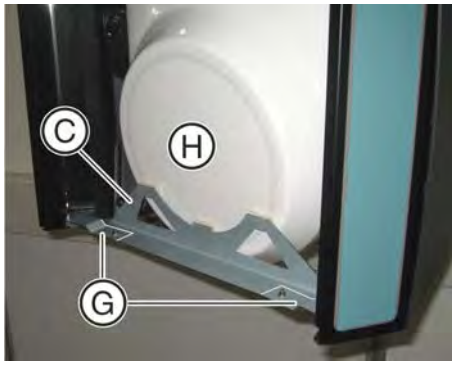
➢ Hang the scan unit carefully on the X-ray detector.

1. Hang the scan unit from behind in the inlets of the X-ray detector.
2. Attach the scan unit loosely with 6 screws (D) - do not screw tightly!





3. Mount the installation aid (C) from below on both sides onto the first cooling vent (H) of the face scan unit.
4. Insert the fastening element (F) into the installation aid (C).



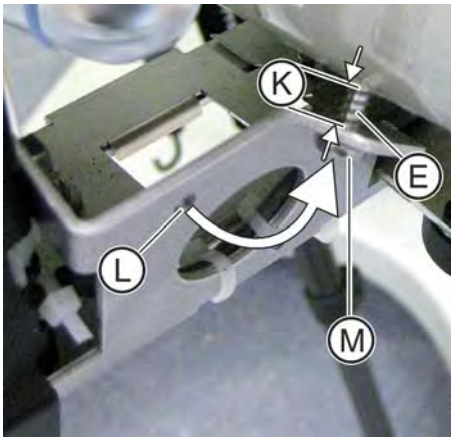
5. Turn the holding plates (G) over the chassis plate of the face scan unit.
6. Push the installation aid (C) with the scan unit on to the sensor surface (H) of the X-ray detector.
7. Align the installation aid (C) to the center of the sensor surface (H).

IMPORTANT

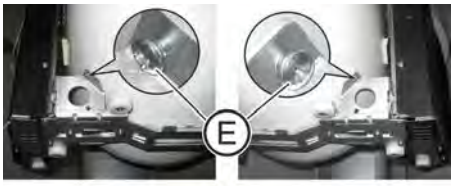
Possible faulty alignment

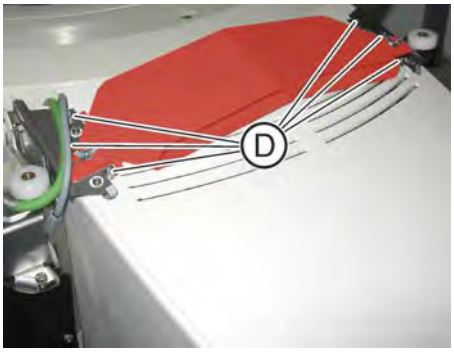
Displacement of the installation aid (C) can be caused through further fastening of the scan unit with the safety screws (E).

➢ When screwing in the safety screws (E), please ensure that the installation aid (C) always remains aligned.

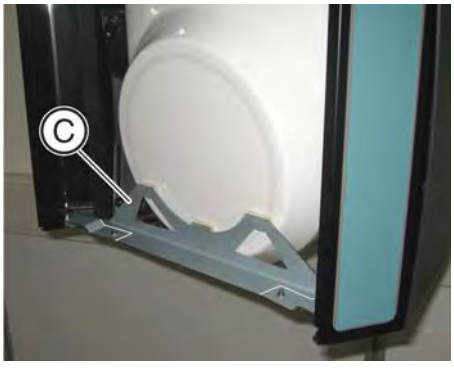


8. Move the safety screw (E) on both sides from the parked position (L) (delivered condition) to the function position (M).
9. Screw the scan unit down from below with the safety screws (E). In so doing, the screws should pierce through the housing of the X-ray detector.
   - The distance (K) between the plate of the scan unit and the cover of the X-ray detector should be 6 mm.



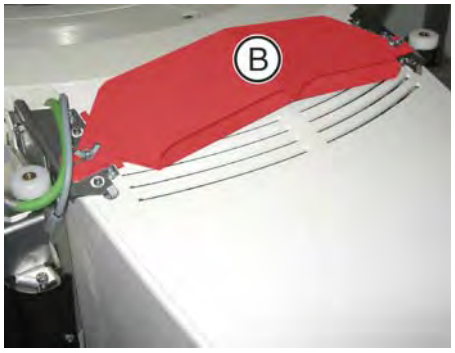


10. Screw down the 6 screws (D).

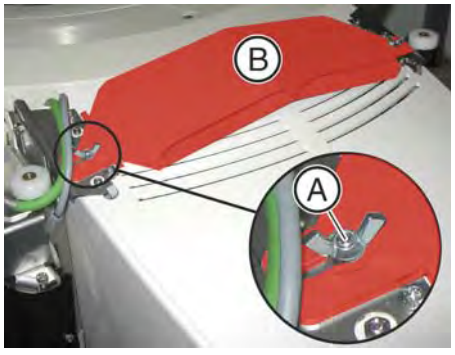


11. Remove the installation aid (C).

IMPORTANT
The mounting aid (C) remains with the customer.



12. Unscrew the transport lock (B).



NOTICE

Keep the transport lock (B) and the wing screws (A) in case the FaceScan unit has to be returned for repairs (these stay with the customer).

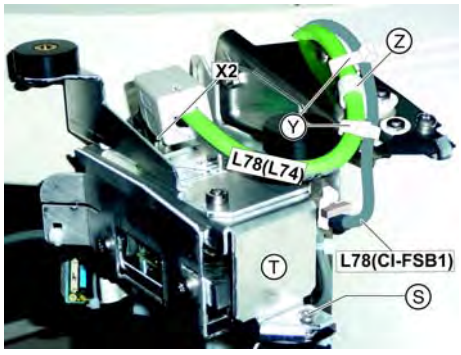
Connecting scan unit electrically

NOTICE

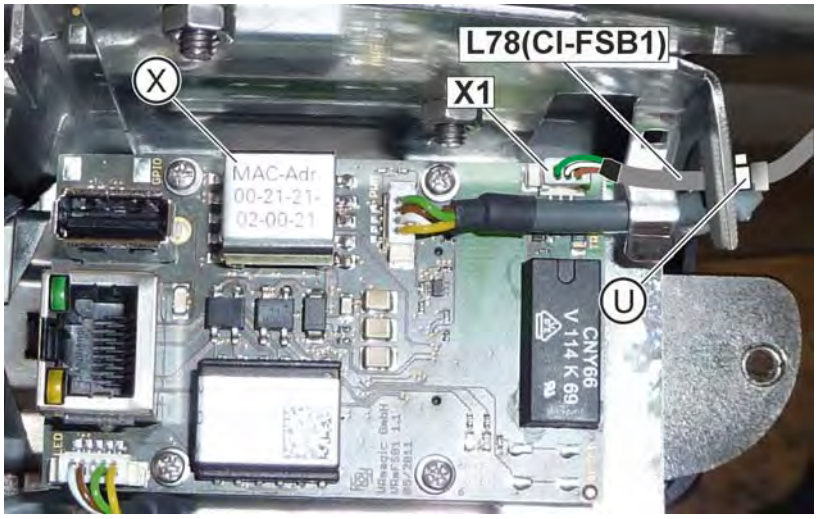
Risk of damage!

Incorrect plug-in directions and routing can damage the face scan unit.

➢ Please make sure of the correct plug-in direction and the correct routing.

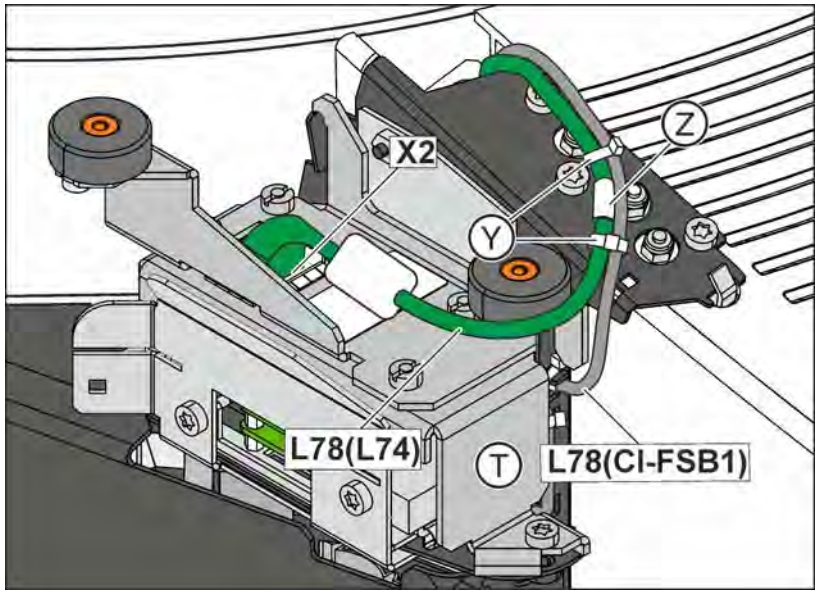


1. Loosen the two screws (S).
2. Remove the protective plate (T).
   ↳ The **FACESCAN** modular board is open.



3. Read the MAC address on the **FACESCAN** modular board at position (X) and note this down.

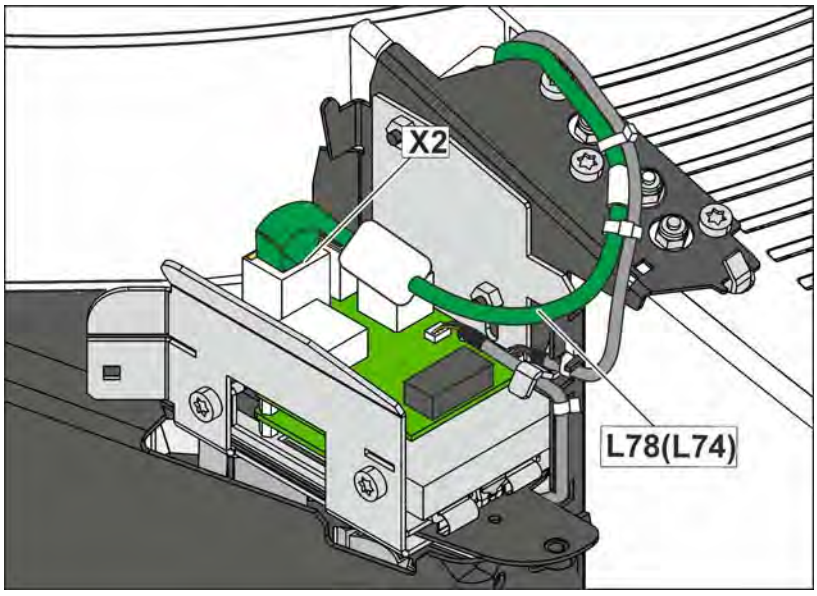
4. Plug cable **L78(CI-FSB1)** in slot **X1** on the **FACESCAN** modular board.
5. Fasten cable **L78(CI-FSB1)** to the side of the chassis with a cable tie (U).



6. Position the protective plate (T).
7. Lay cable **L78(L74)** including the ferrite core on the protective plate as shown.
8. Plug cable **L78(L74)** into slot **X2** (**FACESCAN** modular board).
9. Fasten cable **L78(L74)** with the clip (Z).
10. Fasten cable **L78(CI-FSB1)** with two cable ties (Y) to cable **L78(L74)**.

For network configuration via USB stick

1. Remove cable **L78(L74)** again from slot **X2**.
2. Remove the protective plate (T) again.

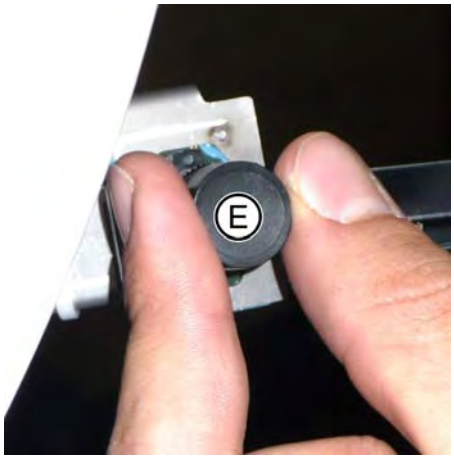


3. Insert cable **L78(L74)** into slot **X2** again.

For network configuration via network cable

➢ Screw down the protective plate (T).

Attaching the cover



1. Remove the protective caps (E) from the four cameras.

IMPORTANT

Permitted cleaning agents

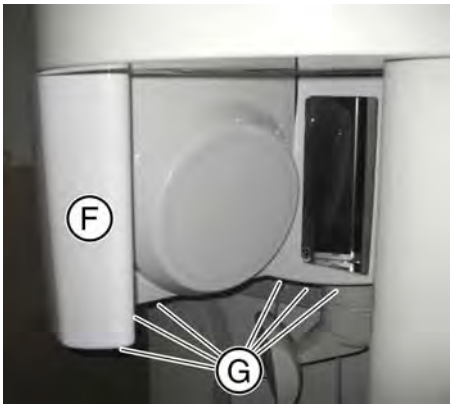
- A dry, lint-free cloth
- A cleaning agent approved by Sirona

An up-to-date list of approved agents can be downloaded from the Internet at the address *"www.sirona.com"*. Select the *"SERVICE"*|*"Care and cleaning"* menu items in the navigation system and then open the *"Care and cleaning agents"* document.

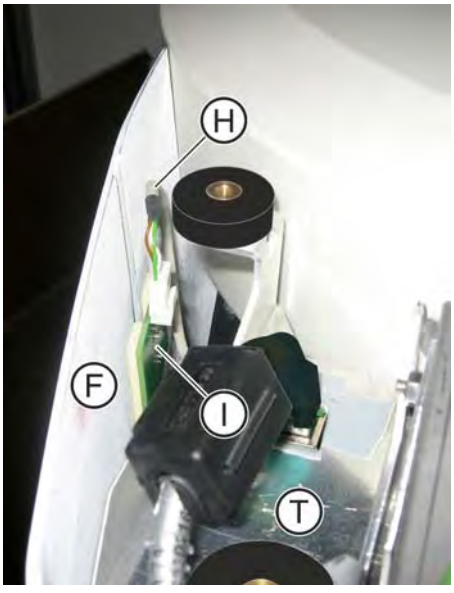
If you have no access to the Internet, please contact your dental depot, to request the list.

REF 59 70 905

2. Clean the surface of the mirror and the vision panel inside the FaceScan cover.

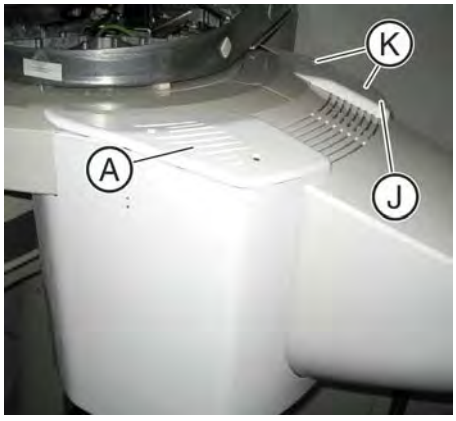


3. Screw down the covering bonnet (F) from below with 6 screws (G).



4. Connect the cable (H) with the display board (I) to the covering bonnet (F).

5. Read the serial number on the identification plate (S) and record this on the device certificate.



6. Screw the right end cap (J) with two screws (K) down on the scan unit.
7. *If network configuration is to be completed later using the FaceScan USB stick:*
   Do not screw the cover cap (A) tight.

or

➢ *If network configuration is to be completed later using a network cable:*
Screw the cover cap (A) down with two screws.

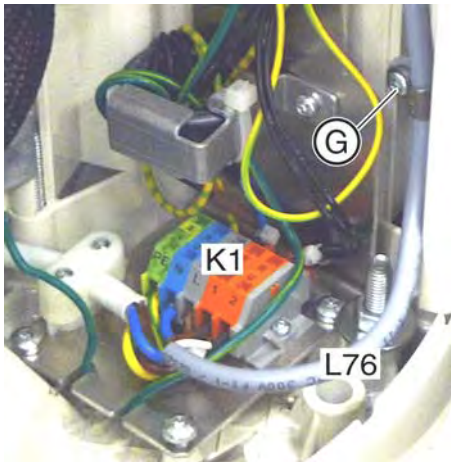
9.9.1.3 What has to be done after replacing the scanner unit?

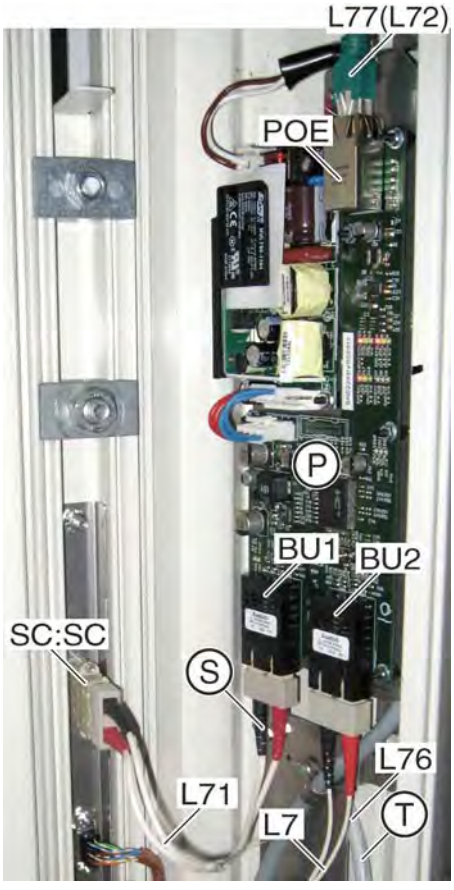
1. Perform a white balance [→ 168].
2. Perform a complete unit adjustment or calibration.
3. Perform some test exposures.

9.9.2 Replacing the PoE module

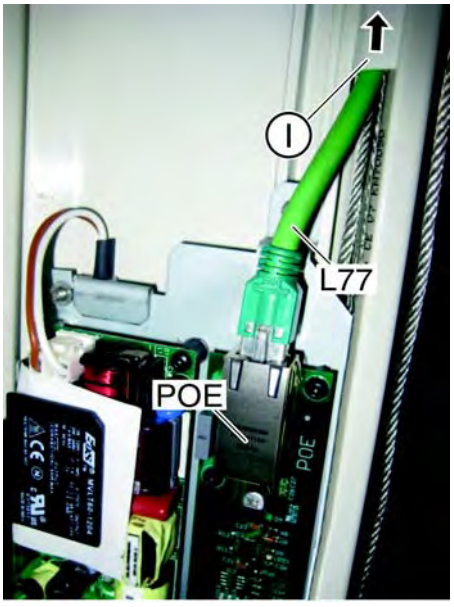
9.9.2.1 Removing the faulty PoE module

1. Remove the bottom profile cover [→ 36].
2. Remove cable **L76** from the cable clamp (G).

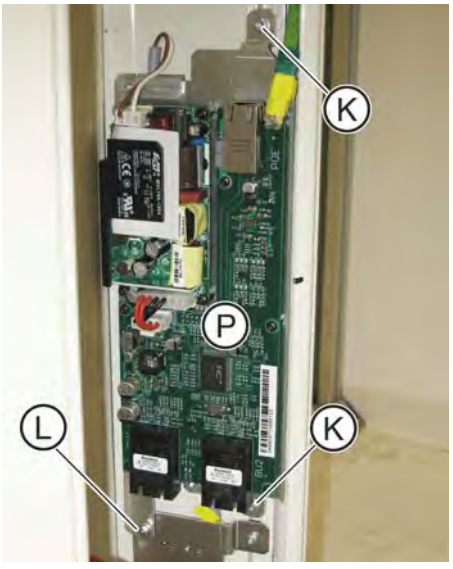




3. Detach cable **L77.WH** (white) and **L77.BN** (brown) from terminals **K1.2** and **K1.1** (orange).
4. Pull cables **L71** and **L7** from sockets **SC:SC** and **BU1**.

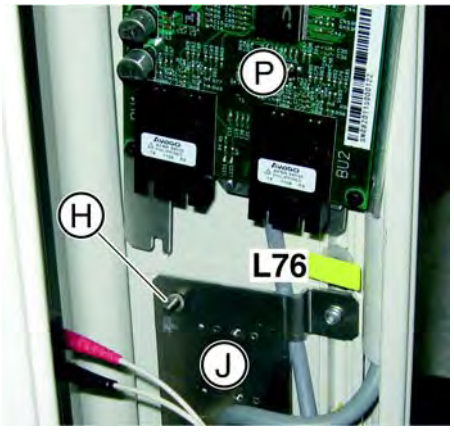


5. Push the cable cover (I) upwards.
6. Unplug the Ethernet cable **L77** from the **POE** socket of the PoE module.

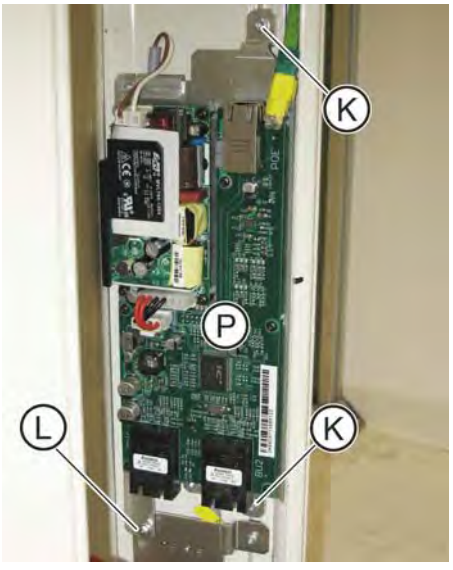


7. Unscrew the two screws (K) and the nuts (L) and remove the PoE module.

9.9.2.2 Installing the new PoE module



1. Put the PoE module (P) on the thread bolts (H) of the mains filter plate (J) (the serrated washer must sit behind the fitting plate of the PoE module).



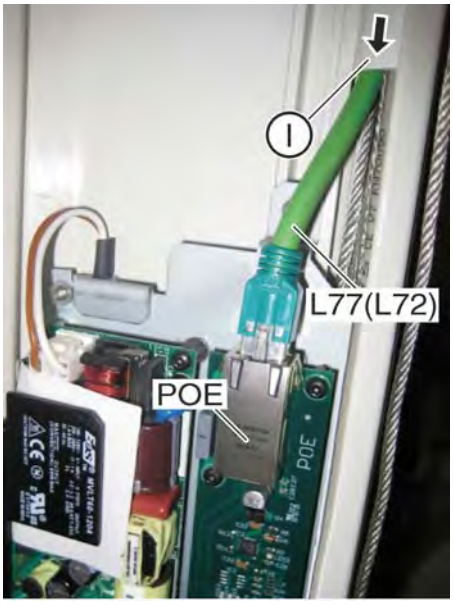
2. Screw down the PoE module (P) to the place provided in the stand with two screws (K) and a nut (L).

IMPORTANT

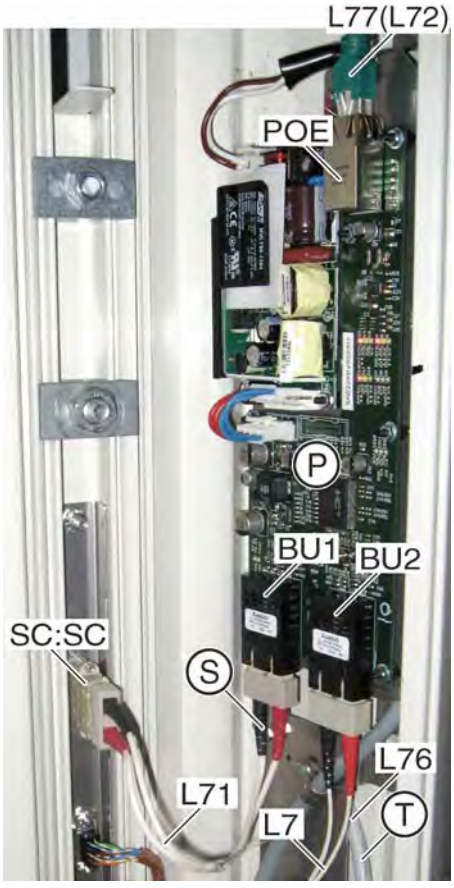
The locking catch of the RJ45 plug of Ethernet cable **L77** is secured with adhesive tape (N).

➢ Remove the adhesive tape (N) from the RJ45 plug of Ethernet cable **L77**.

3. Plug Ethernet cable **L77** into the **POE** socket of the PoE module.

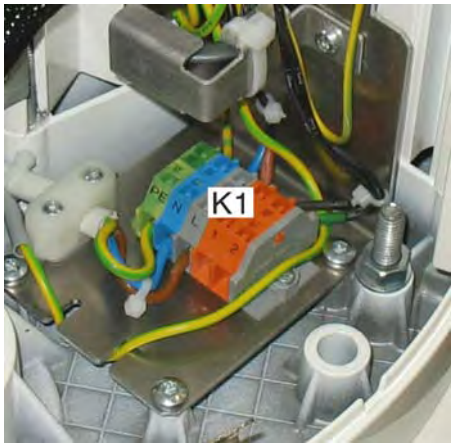


4. To fasten, slide the cable cover (I) downwards again as far as possible.

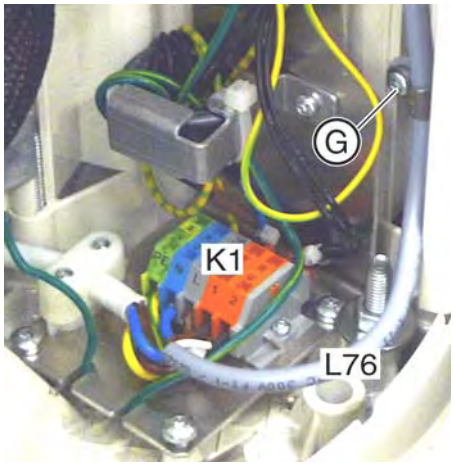


5. Pull cable **L7** from the **SC:SC** socket.
6. Plug cable **L7** into the **BU2** socket of the PoE module.
7. Plug cable **L71** into the **BU1** socket of the PoE module.
8. Plug cable **L71** into the **SC:SC** socket.

IMPORTANT
Cable **L76** must be routed behind the mains filter plate (J).



9. Route cable **L76** behind the mains filter plate to the terminal **K1**.

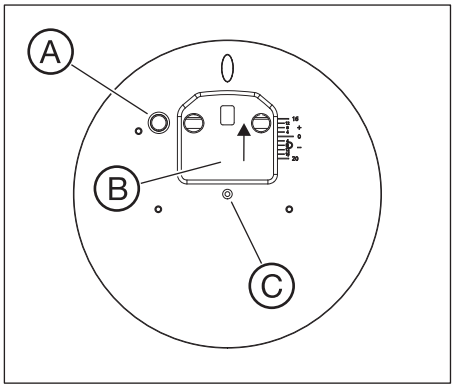


10. Connect cable **L77.BN** (brown) to terminal **K1.1** (orange).
11. Connect cable **L77.WH** (white) to terminal **K1.2** (orange).
12. Fasten cable **L76** as low as possible downwards with the cable clamp (G).
13. Refit the bottom profile cover.

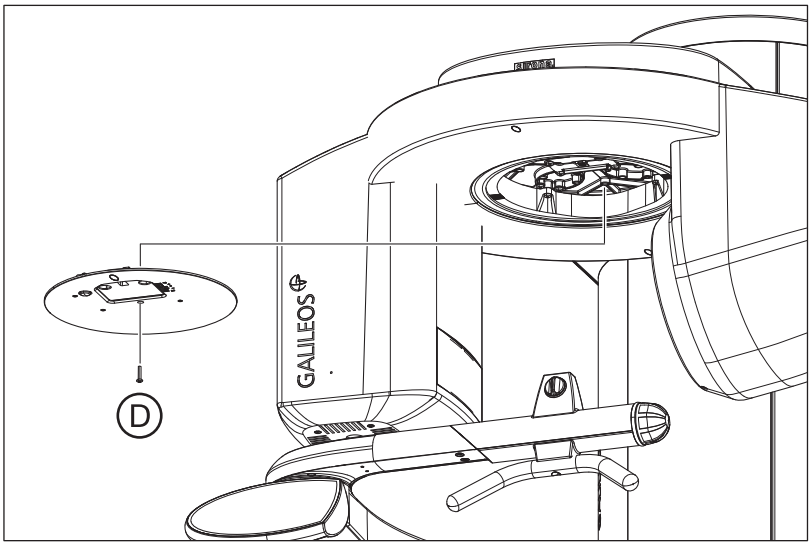
9.10 Head fixation device

9.10.1 Replacing receptacle element for head fixation (for unit with head fixation device)

Remove defective receptacle element.

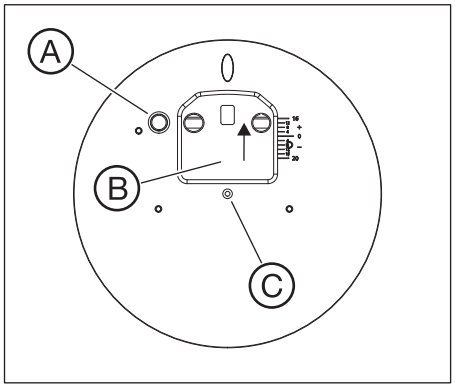


1. Using the Up/Down buttons on the control panel, switch the device on and move it to a comfortable working height to remove the acquisition unit.
2. Remove the head fixation device (see operating instructions).
3. *If the bore hole (C) on the defective acquisition unit is not available:* Press the locking button (**A**) and move the flange (**B**) forward to expose the bore hole (**C**).

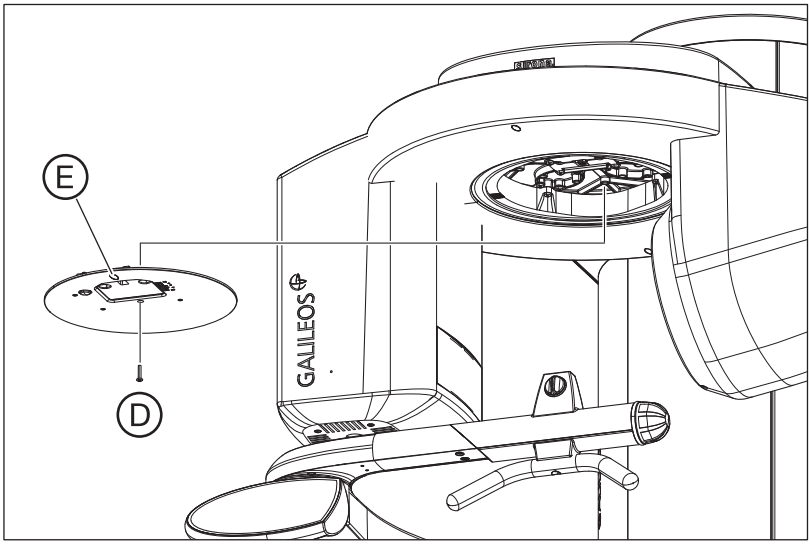


4. Loosen screw (**D**) and remove the defective acquisition unit.

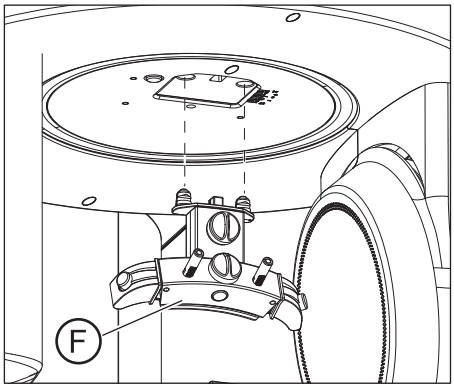
Install the new acquisition unit.



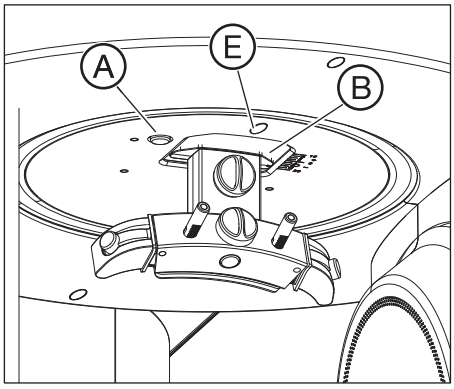
1. *If the bore hole C on the new acquisition unit is not available:*
Press the locking button (**A**) and move the flange (**B**) forward to expose the bore hole (**C**).



2. **IMPORTANT:** Do not tighten the screw yet. It should not be possible to rotate the acquisition unit.
Screw the new receptacle element on to the unit with screw (**D**) so that the laser localizer (**E**) is facing forward.

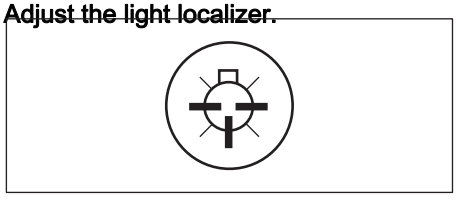


3. Push the head fixation device (**F**) into the acquisition unit (see operating instructions).

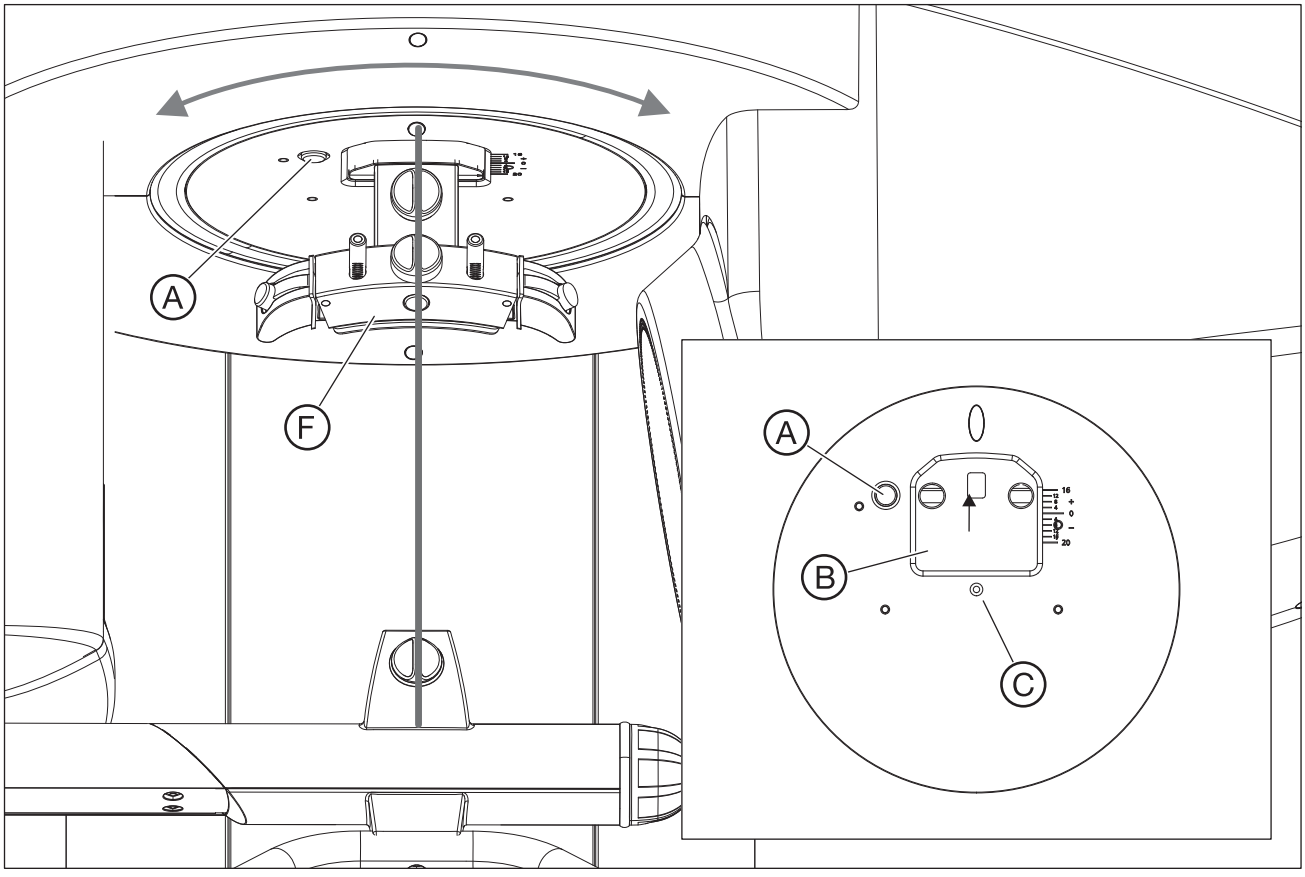


4. Press the locking button (**A**) and push the flange (**B**) including the head fixation device backwards so that the light localizer (**E**) is exposed.

Adjust the light localizer.



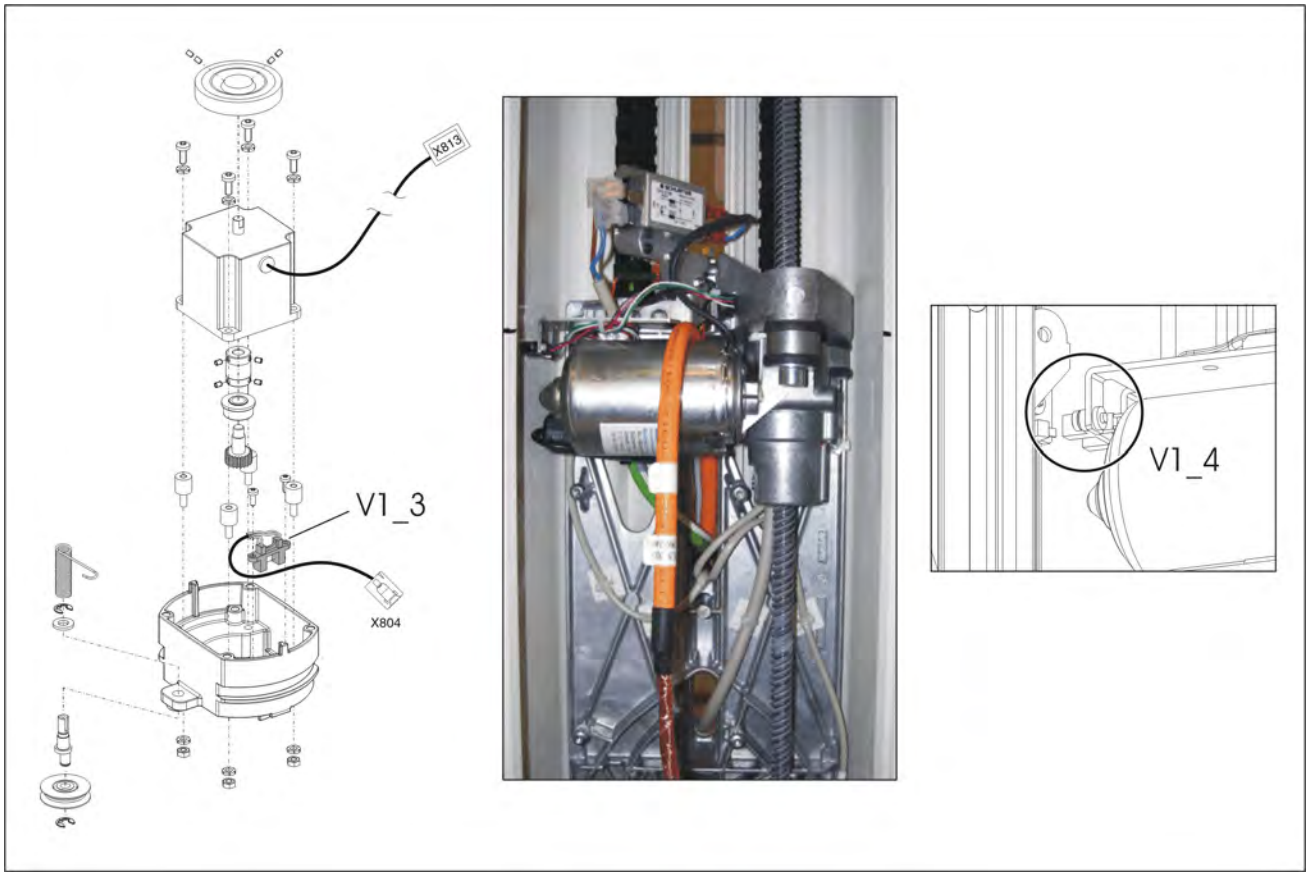
1. **CAUTION! Keep a minimum distance of 100 mm between the eye and the laser. Do not look directly into the laser beam.**
   Switch the laser light on using the light localizer button on the control panel.



2. Align the acquisition unit.
   To do this, move the rotary knobs on the head fixation device to a vertical position. Then align the acquisition unit so that the laser light is shown in the middle of the vertical knobs of the head fixation device and the bite holder.
3. Press the locking button (**A**) and push the flange (**B**) including the head fixation device (**F**) back to the front so that the bore hole (**C**) is exposed. Tighten the screw (**D**) firmly.
   IMPORTANT: The acquisition unit should not be turned when pushing the head fixation device back and tightening the screw.
4. Switch the unit off again.

9.11 Light barriers

9.11.1 Replacing the light barriers



The following light barriers can be replaced:

- Light barrier at ring motor, starting position of rotation: **V1_3**
- Light barrier at HA motor, height adjustment: **V1_4**

9.12 Boards

9.12.1 Important notes about replacing boards

NOTICE

Touching the boards can damage them.

Please observe the usual precautionary measures for handling printed circuit boards (ESD). Touch a ground point to discharge static electricity before touching any boards.

Prior to replacing boards

You must observe the notes in the chapter !

This chapter describes all measures required after the replacement of modules or boards, provided they were known at the time of publication. You will find more up-to-date information and supplements concerning

this subject on the latest GALILEOS XG CD and on the Sirona dealer page on the Internet. For this reason, you should always check for the latest information on the replacement of modules and performing updates before you start replacing any modules or boards.

Replacing the boards DX6 (X-ray tube assembly) and DX11 or DX89 and DX11

Never replace these boards at the same time. After replacing one of these boards, you must first perform the measures specified in the chapter and then restart the unit. Only then may you begin replacement of the other module.

Prior to replacing board DX11

If the old DX11 is still working:

Call the "Extended Details" via SiXABCon and check the switching plate configuration for the swivel arm. If it deviates from 01 this must be configured again after inserting a new DX11 using service routine S017.7.

For GALILEOS Comfort: If the old DX11 is still working:

Call up the "Extended Details" via SiXABCon, search for the “Language Set ID“ (under "Extended Configuration DX7") and note the configuration of the language set. If it deviates from 00, the language set must be configured again after inserting a new DX11 using service routine S017.5 [→ 222].

Following replacement of board DX11, the user preferences (patient symbols, initial position, default contrast mode, etc.) are lost. Instruct the user accordingly or set these values after replacing the board, provided that they were properly noted down before the board was replaced.

Connector designations on the boards

The connectors on the boards are labeled on delivery of the system.

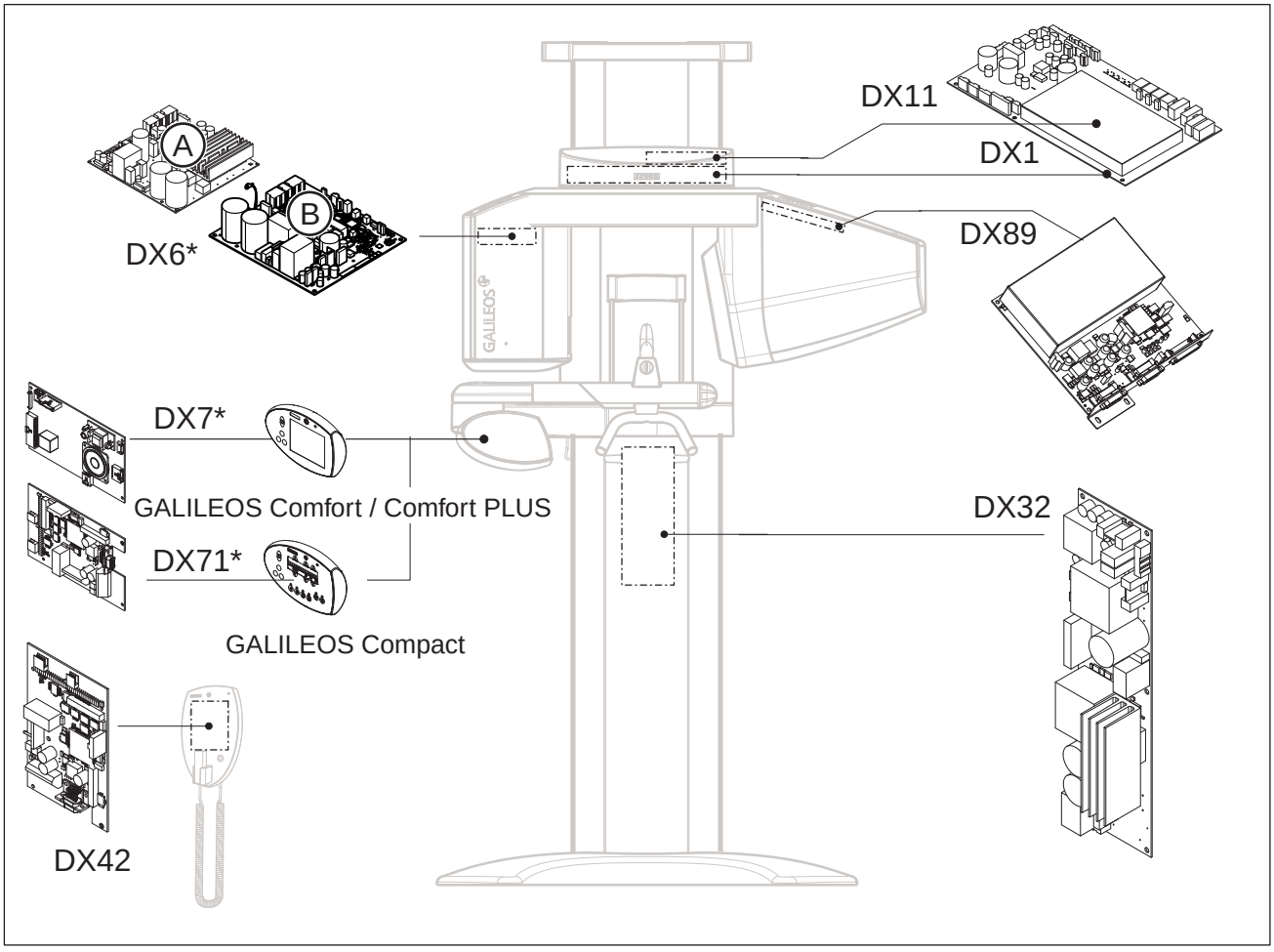
Tip: Check the designations on the connectors when pulling off the cables and label them correctly if necessary.

9.12.2 Replacing boards

⚠ CAUTION

Risk of damage to boards

Please observe the usual precautionary measures for handling printed circuit boards (ESD).
Touch a ground point to discharge static electricity before touching any boards.

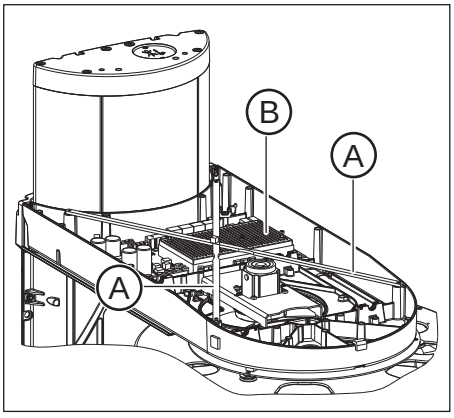


Component	Designation	Function
Boards	DX1	Open loop/closed loop control in general
	DX11	Controller board
	DX6*	Open loop/closed loop tube assembly
	DX7*	Easypad touchscreen (GALILEOS Comfort/Comfort^{PLUS})
	DX71*	LED display on Multipad (GALILEOS Compact)
	DX89	Image memory of the X-ray detector
	DX42	Remote control

*) not available as individual repair part (see spare parts list).

9.12.2.1 Replacing PC board DX1

IMPORTANT
The software version of the "DX1/DX11 board" must be compatible with the main software version of the unit.



1. Remove the "arm cover".
2. Disassemble both cross braces (**A**).
3. **CAUTION! Touch a ground point to discharge static electricity before touching any boards.**
   Remove the cover plate (**B**) of the board **DX11**.
4. Pull all cables off of board **DX1**.
5. Disassemble and remove the defective board **DX1**.
6. **NOTICE!** You must observe the notes in the chapter titled Replacing board DX11 [→ 305]
   Install the **DX11** board from the defective **DX1** on the new **DX1**.
7. Reinstall the **DX1** board in the unit and reattach the connectors.
8. Reassemble both cross braces (**A**).
9. Reattach the covers.

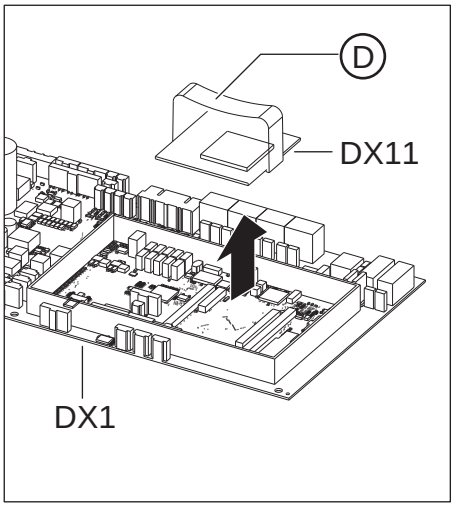
NOTICE! Once you have removed the cross braces (A), the unit must be completely readjusted or recalibrated.

After replacing the board **DX1**, you must observe the notes provided in the chapter .

9.12.2.2 Replacing board DX11

✓ The cover plate of board **DX11** must be removed [→ 304].

1. **CAUTION! Touch a ground point to discharge static electricity before touching any boards.**
   Pull the defective **DX11** board using the removal tool (**D**) to remove it from the **DX1** board.
   IMPORTANT: The removal tool (**D**) is included in the delivery scope of the **DX11** board.



2. **NOTICE! Ensure that the connector strips of boards DX1 and DX11 are aligned precisely above one another and are not offset, before pressing the boards together firmly.**
   Attach the new **DX11** board on to the **DX1**.
3. Check that the **DX11** board is correctly attached to the **DX1** board. There must be no visible gap between the connector strips.
4. Reattach the cover plate.

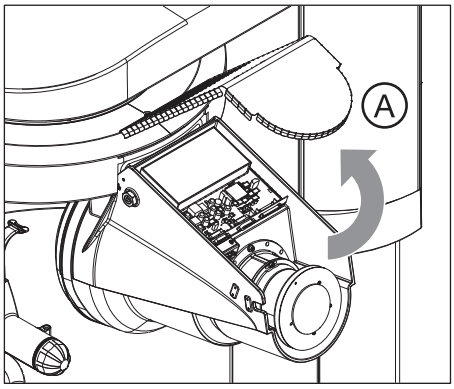
After replacing the board **DX11**, you must observe the notes provided in the chapter .

9.12.2.3 Replacing board DX32

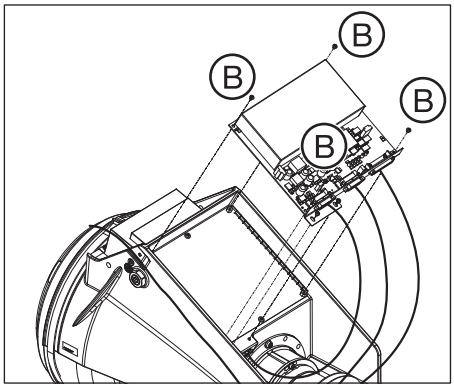
The removal of the board **DX32** is described in the chapter Removing board DX32 [→ 254] . Install the board by following the same procedure in reverse order.

After replacing the board **DX32**, you must observe the notes provided in the chapter .

9.12.2.4 Replace board DX89



1. Remove the "x-ray detector cover".
2. Carefully pull cover plate (**A**) upwards to remove it from the X-ray detector.



3. Remove the four screws (**B)** and remove the defective **DX89** board from the X-ray detector.
4. Pull the connectors of cables **L13** (X201), **L27** (X203) and **L28** (X400) off of the defective board **DX89**.
5. Install the new board **DX89** by following the steps for removal in reverse order.

IMPORTANT: After replacing the board **DX89**, always observe the notes provided in the chapter .

9.12.3 Measures following replacement of boards

After replacing boards or modules containing boards, check to make sure that the software version of the module corresponds to the current software status of the system. The software versions of the modules can be queried by running service routine S008.2 or using the extended detail query in SiXABCon. You can also check the info screen in advance to determine whether the current software constellation is permissible. If this is not the case, the version number of the main software is labeled with an asterisk (e.g. V04.12.00*)

In the event of software incompatibilities, perform a software update or downgrade [→ 47].

Always perform the measures described below in the given sequence and do not carry out any other actions between the steps.

The following table provides an overview of various possible replacement situations and cross-references to detailed descriptions of the actions required for the corresponding situations following board replacement.

Board	Constellation	Measures	Page
DX1	Inserting a *new DX1*		
	• *GALILEOS Compact* • *GALILEOS Comfort* • *GALILEOS Comfort PLUS* • • Unit software version *V04.12.00 or higher*	• Switch the unit on. • Perform a complete unit adjustment or calibration.	S. [→ 145]
DX11	*Replacing a DX11* **The unit software version must be at least V04.12.00. Please note compatibility restrictions with the SIDEXIS and plug-in versions.**		
	• Inserting a *new DX11* • • *GALILEOS Comfort* • GALILEOS Comfort PLUS • • Unit software version *V04.12.00 or higher*	Proceed as described in the chapter "", *Case A*.	S. [→ 310]
	• Inserting a *DX11 from another unit* • • *GALILEOS Comfort* • GALILEOS Comfort PLUS • • Unit software version *V04.12.00 or higher*	Proceed as described in the chapter "", *Case B*.	S. [→ 311]
	• Inserting a *new DX11* • • *GALILEOS Compact* • • Unit software version *V04.12.00 or higher*	Proceed as described in the chapter "", *Case C*.	S. [→ 313]
	• Inserting a *DX11 from another unit* • • *GALILEOS Compact* • • Unit software version *V04.12.00 or higher*	Proceed as described in the chapter "", *Case D*.	S. [→ 314]

Board	Constellation	Measures	Page
DX6 Tube assembly	Replacing a *tube assembly, including board DX6*		
	• Inserting a *new X-ray tube assembly* • • *GALILEOS Comfort* • *GALILEOS Comfort PLUS* • • Unit software version *V04.12.00 or higher*	Proceed as described in the chapter Replacing the tube assembly including board DX6 [→ 316], *Case E*.	S. [→ 316]
	• Inserting an *X-ray tube assembly from another unit* • • *GALILEOS Comfort* • *GALILEOS Comfort PLUS* • • Unit software version *V04.12.00 or higher*	Proceed as described in the chapter Replacing the tube assembly including board DX6 [→ 316], *Case F*.	S. [→ 317]
	• Inserting a *new X-ray tube assembly* • • *GALILEOS Compact* • • Unit software version *V04.12.00 or higher*	Proceed as described in the chapter Replacing the tube assembly including board DX6 [→ 316], *Case G*.	S. [→ 318]
	• Inserting an *X-ray tube assembly from another unit* • • *GALILEOS Compact* • • Unit software version *V04.12.00 or higher*	Proceed as described in the chapter Replacing the tube assembly including board DX6 [→ 316], *Case H*.	S. [→ 319]

Board	Constellation	Measures	Page
DX7 Easypad	• Inserting a *new Easypad incl. DX7* • • Unit software version *V04.12.00 or higher*	• Switch the unit on. • Update the unit software to version V04.12.00 or higher. After replacing the Easypad, the language set on board DX7 is set to the factory default setting (00 = German, English, French, Italian). If the configured unit language set (which can be queried by running service routine S017.5 or via the "Extended Details" in SiXABCon) has a configuration other than 00, this configuration will be copied to board DX7 by the update function.	S. [→ 47]
DX71 Multipad	• Inserting a *new Multipad incl. DX71* • • Unit software version *V04.12.00 or higher*	• Switch the unit on. • Update the unit software to version V04.12.00 or higher.	S. [→ 47]
DX32 Stand	• Inserting a *new DX32* • • Unit software version *V04.12.00 or higher*	No further action is required	
DX42 Remote control	Inserting a *new DX42*		
	• Inserting a *new DX42* • • *GALILEOS Compact* • *GALILEOS Comfort* • *GALILEOS Comfort PLUS* • • Unit software version *V04.12.00 or higher*	• Switch the unit on. • Update the unit software to version V04.12.00 or higher.	S. [→ 47]
DX89 X-ray detector	Inserting a *new DX89*		
	• Inserting a *new DX89* • • *GALILEOS Compact* • *GALILEOS Comfort* • *GALILEOS Comfort PLUS* • • Unit software version *V04.12.00 or higher*	• Switch the unit on. • Update the unit software to version V04.12.00 or higher.	S. [→ 47]
		• Restore the configuration data of board DX89 by using service routine S009.7.	S. [→ 209]

9.12.3.1 After changing the DX11 board

Case A:

- **New DX11**
- **GALILEOS Comfort**
- **GALILEOS Comfort PLUS**
- **Unit software version V04.12.00 or higher**

NOTICE

After a new DX11 is inserted, the IP address is initially reset to the factory setting. Before you set the unit to a new IP address, make sure that the IP address you're assigning has not been assigned to any other unit.

1. Switch the unit on.
   Do not acknowledge any error messages at this time.
2. Install the current version of the SIDEXIS software (V2.5.6 or higher). If the current version of SIDEXIS is a patch version, the previous official main version of SIDEXIS XG must be installed before you can install the current version.
3. Update the software to version V04.12.00 or higher (via automatic update) [→ 47].
4. If multiple units are installed in a single network:
   Set the IP address via SiXABCon.
5. Switch off the unit.
6. Wait for approx. 1 minute. Then switch the unit back on.
   The error message **E1 10 03** (format flash file system) is displayed.
   The message *"No Key"* is displayed on the Easypad.
7. Press the R key to acknowledge the error message.
   The formatting of the flash file system is started automatically. Error message **E1 10 04** is displayed during the entire process (approx. 5 - 6 min.). When the formatting is finished, the error message is automatically acknowledged by the system and error message **E6 11 07** (undefined system class) is displayed.
8. Press the R key to acknowledge the error message.
   The access level for the service menu (level 4) is automatically started.
9. Press and hold down the Service key until the patient symbol keys light up (approx. 2 s).
10. Then press the patient symbol keys in the sequence b - d - a within the next 4 seconds.
    After you have entered the key combination correctly, the service routine S017, test step 1 (select/confirm system class) is started automatically. The Memory key lights up.
11. Acknowledge any additional error messages with the R key .
12. Confirm the "GALILEOS Comfort" system class (03):
    To do this, first press the Memory key (R key lights up) and then the R key.
13. Exit the service routine with the double-arrow key.
14. Switch off the unit.

15. Wait for approx. 1 minute. Then switch the unit back on.
The error message **E6 15 05** (undefined system serial number) is displayed.
16. Acknowledge the error message with the R key .
17. Error message **E6 15 04** (undefined activation data) is displayed.
18. Acknowledge the error message with the R key .
19. Call the service menu [→ 180].
20. Call the service routine S008.3, check the serial number, and confirm this if necessary [→ 204].
The unit serial number is located on the nameplate of the unit.
NOTICE! If the serial number is incorrect, exit the update process and contact the Sirona Customer Service Center.
21. Switch off the unit.
22. Wait for approx. 1 minute. Then switch the unit back on.
The message *"No Key"* should no longer appear.
23. Call the service menu [→ 180].
24. Call service routine S017 and perform the unit configuration (test step 2-15).
The switching plate configuration of the swivel arm must be checked/ set using service routine S017.7.
Inform the customer of the configuration options of the software version, e.g. welcome screen, acoustic exposure signal. Activate these functions if they are required.
25. If the travel height of the unit has to be limited:
Set the travel height with service routine S018.2 [→ 232].
26. Perform a software update to the current software version [→ 47].
This updates all modules in accordance with the configuration.
The error message **E1 11 20** (invalid unit calibration) is displayed.
27. Acknowledge the error message with the R key .
28. Perform a complete unit calibration [→ 145].
After a successful unit calibration has been performed, the error message should no longer appear.
29. Call up the "Extended Details" via SiXABCon.
This generates an XML file (with the system parameters) which is Filed in the PDATA/.../P2K_Config directory under the network name of the unit.

- The process is completed.

Case B:

- **DX11 from another unit**
- **GALILEOS Comfort**
- **GALILEOS Comfort PLUS**
- **Unit software version V04.12.00 or higher**

IMPORTANT: The DX11 can be replaced in either the Comfort class (GALILEOS Comfort/Comfort^{PLUS} ◆ or the Compact class.

NOTICE

After inserting the board, you must reconfigure the IP address to match the IP address of the existing X-ray component. Before you set the unit to a new IP address, make sure that the IP address you're assigning has not been assigned to any other unit.

1. Switch the unit on.
   Do not acknowledge any error messages at this time.
2. Install the current version of the SIDEXIS XG software (V2.5.6 or higher).
   If the current version of SIDEXIS XG is a patch version, the previous official main version of SIDEXIS XG must be installed before you can install the current version.
3. Update the software to version V04.12.00 or higher (via automatic update) [→ 47].
   Even if you are using a DX11 that already has the same software version as the overall system, the software must still be updated to this version again so that an administrative entry can be made in the memory of the DX11.
4. Switch off the unit.
5. Wait for approx. 1 minute. Then switch the unit back on.
   The error message **E6 15 05** (undefined system serial number) is displayed. The message *"No Key"* is displayed on the Easypad.
6. Acknowledge the error message with the R key .
7. Call the service menu [→ 180].
8. Call service routine S008.3 [→ 204].
9. Enter the unit serial number found on the nameplate of the unit [→ 204].
   IMPORTANT: Any serial number which is unknown to the unit will not be accepted by the unit. The serial number entered must be identical to the number on the nameplate of the unit. If an inadmissible serial number is entered, the input will not be accepted and the serial number can be entered again.
10. Switch off the unit.
11. Wait for approx. 1 minute. Then switch the unit back on.
    In systems that already run with a system software version V03.03.01 or higher, please check whether there is a XML file in the PDATA/.../P2K_Config with the network name of the system. This file contains important information about the previous unit configuration.
    The error message **E1 11 20** (invalid unit calibration) is displayed.
12. Acknowledge the error message with the R key .
13. Call the service menu [→ 180].
14. Call service routine S017 and perform the unit configuration (test step 2-15).
    The switching plate configuration of the swivel arm must be checked/set using service routine S017.7.
    Inform the customer of the configuration options of the software version, e.g. welcome screen, acoustic exposure signal. Activate these functions if they are required.
15. If the travel height of the unit has to be limited:
    Set the travel height with service routine S018.2 [→ 232].

16. Perform a software update to the current software version [→ 47].
This updates all modules in accordance with the configuration.
17. Perform a complete unit calibration [→ 145].
After a successful unit calibration has been performed, the error message should no longer appear.
18. Call up the "Extended Details" via SiXABCon.
This generates an XML file (with the system parameters) which is Filed in the PDATA/.../P2K_Config directory under the network name of the unit.

- The process is completed.

Case C:

- **New DX11**
- **GALILEOS Compact**
- **Unit software version V04.12.00 or higher**

NOTICE

After a new DX11 is inserted, the IP address is initially reset to the factory setting. Before you set the unit to a new IP address, make sure that the IP address you're assigning has not been assigned to any other unit.

1. Switch the unit on.
Do not acknowledge any error messages at this time.
2. Install the current version of the SIDEXIS XG software (V2.5.6 or higher).
If the current version of SIDEXIS XG is a patch version, the previous official main version of SIDEXIS XG must be installed before you can install the current version.
3. Update the software to version V04.12.00 or higher (via automatic update) [→ 47].
4. If multiple units are installed in a single network:
Set the IP address via SiXABCon.
5. Switch off the unit.
6. Wait for approx. 1 minute. Then switch the unit back on.
The error message **E1 10 03** (format flash file system) is displayed.
The message *"No Key"* is displayed on the Multipad.
7. Press the R key to acknowledge the error message.
The formatting of the flash file system is started automatically. Error message **E1 10 04** is displayed during the entire process (approx. 5 - 6 min.). When the formatting is finished, the error message is automatically acknowledged by the system and error message **E6 11 07** (undefined system class) is displayed.
8. Press the R key to acknowledge the error message.
The access level for the service menu (level 4) is automatically started.
9. Press and hold down the Service key until the LEDs above the patient symbol keys light up (approx. 2 s).
10. Then press the patient symbol keys in the sequence b - d - a within the next 4 seconds.
After you have entered the key combination correctly, the service

routine S017, test step 1 (select/confirm system class) is started automatically. The LED above the Memory key lights up.

11. Acknowledge any additional error messages with the R key .
12. Confirm the "GALILEOS Compact" system class (04):
    To do this, first press the Memory key (LED above the R key lights up) and then the R key.
13. Exit the service routine by pressing the arrow key above selection field 3.
14. Switch off the unit.
15. Wait for approx. 1 minute. Then switch the unit back on.
    The error message **E6 15 05** (undefined system serial number) is displayed.
16. Acknowledge the error message with the R key .
17. Error message **E6 15 04** (undefined activation data) is displayed.
18. Acknowledge the error message with the R key .
19. Call the service menu [→ 180].
20. Call the service routine S008.3, check the serial number, and confirm this if necessary [→ 204].
    The unit serial number is located on the nameplate of the unit.
    NOTICE! If the serial number is incorrect, exit the update process and contact the Sirona Customer Service Center.
21. Switch off the unit.
22. Wait for approx. 1 minute. Then switch the unit back on.
    The message *"No Key"* should no longer appear.
23. Call the service menu [→ 180].
24. Call service routine S017 and perform the unit configuration (test step 2-15).
    The switching plate configuration of the swivel arm must be checked/set using service routine S017.7.
    Inform the customer of the configuration options of the software version, e.g. acoustic exposure signal. Activate these functions if they are required.
25. If the travel height of the unit has to be limited:
    Set the travel height with service routine S018.2 [→ 232].
26. Perform a software update to the current software version [→ 47].
    This updates all modules in accordance with the configuration.
    The error message **E1 11 20** (invalid unit calibration) is displayed.
27. Acknowledge the error message with the R key .
28. Perform a complete unit calibration [→ 145].
    After a successful unit calibration has been performed, the error message should no longer appear.
29. Call up the "Extended Details" via SiXABCon.
    This generates an XML file (with the system parameters) which is Filed in the PDATA/.../P2K_Config directory under the network name of the unit.

- The process is completed.

Case D:

- **DX11 from another unit**
- **GALILEOS Compact**
- **Unit software version V04.12.00 or higher**

IMPORTANT: The DX11 can be replaced in either the Comfort class (GALILEOS Comfort/Comfort^{PLUS} ◆ or the Compact class.

NOTICE

After inserting the board, you must reconfigure the IP address to match the IP address of the existing X-ray component. Before you set the unit to a new IP address, make sure that the IP address you're assigning has not been assigned to any other unit.

1. Switch the unit on.
   Do not acknowledge any error messages at this time.
2. Install the current SIDEXIS XG software version (V2.5.6 or higher).
   If the current version of SIDEXIS XG is a patch version, the previous official main version of SIDEXIS XG must be installed before you can install the current version.
3. Update the software to version V04.12.00 or higher (via automatic update) [→ 47].
   Even if you are using a DX11 that already has the same software version as the overall system, the software must still be updated to this version again so that an administrative entry can be made in the memory of the DX11.
4. Switch off the unit.
5. Wait for approx. 1 minute. Then switch the unit back on.
   The error message **E6 15 05** (undefined system serial number) is displayed. The message *"No Key"* is displayed on the Easypad.
6. Acknowledge the error message with the R key .
7. Call the service menu [→ 180].
8. Call service routine S008.3 [→ 204].
9. Enter the unit serial number found on the nameplate of the unit [→ 204].
   IMPORTANT: Any serial number which is unknown to the unit will not be accepted by the unit. The serial number entered must be identical to the number on the nameplate of the unit. If an inadmissible serial number is entered, the input will not be accepted and the serial number can be entered again.
10. Switch off the unit.
11. Wait for approx. 1 minute. Then switch the unit back on.
    In systems that already run with a system software version V03.03.01 or higher, please check whether there is an XML file in the PDATA/.../P2K_Config with the network name of the system. This file contains important information about the previous unit configuration.
    The error message **E1 11 20** (invalid unit calibration) is displayed.
12. Acknowledge the error message with the R key .
13. Call the service menu [→ 180].
14. Call service routine S017 and perform the unit configuration (test step 2-15).
    The switching plate configuration of the swivel arm must be checked/set using service routine S017.7.
    Inform the customer of the configuration options of the software version, e.g. welcome screen, acoustic exposure signal. Activate these functions if they are required.

15. If the travel height of the unit has to be limited:
Set the travel height with service routine S018.2 [→ 232].
16. Perform a software update to the current software version [→ 47].
This updates all modules in accordance with the configuration.
17. Perform a complete unit calibration [→ 145].
After a successful unit calibration has been performed, the error message should no longer appear.
18. Call up the "Extended Details" via SiXABCon.
This generates an XML file (with the system parameters) which is Filed in the PDATA/.../P2K_Config directory under the network name of the unit.

- The process is completed.

9.12.3.2 Replacing the tube assembly including board DX6

Case E:

- **New tube assembly**
- **GALILEOS Comfort**
- **GALILEOS Comfort PLUS**
- **Unit software version V04.12.00 or higher**

1. Switch the unit on.
2. If the software version of the newly installed DX6 does not match the latest main software version: Perform a software update to the latest version [→ 47].
3. Switch off the unit.
4. Wait for approx. 1 minute. Then switch the unit back on.
The error message **E6 11 07** (undefined unit class) is displayed. The message No Key is displayed on the Easypad.
5. Press the R key to acknowledge the error message.
The access level for the service menu (level 4) is automatically started.
6. Press and hold down the Service key until the patient symbol keys light up (approx. 2 s).
7. Then press the patient symbol keys in the sequence b - d - a within the next 4 seconds.
After you have entered the key combination correctly, the service routine S017, test step 1 (select/confirm system class) is started automatically. The Memory key lights up.
8. Acknowledge any additional error messages with the R key .
9. Confirm the "GALILEOS Comfort" (03) or "GALILEOS Comfort PLUS" unit class:
To do this, first press the Memory key (R key lights up) and then the R key.
10. Exit the service routine with the double-arrow key.
11. Switch off the unit.
12. Wait for approx. 1 minute. Then switch the unit back on.
The error message **E6 15 05** (undefined system serial number) is displayed.

13. Press the R key to acknowledge the error message.
The error message **E7 11 15** (incorrect collimator configuration) is displayed.
14. Acknowledge the error message with the R key .
15. Call the service menu [→ 180].
16. Call the service routine S008.3, check the serial number, and confirm this if necessary [→ 204].
The unit serial number is located on the nameplate of the unit.
NOTICE! If the serial number is incorrect, exit the update process and contact the Sirona Customer Service Center.
17. Call service routine S017.25 and configure the installed diaphragm type.
18. Switch off the unit.
19. Wait for approx. 1 minute. Then switch the unit back on.
The message No Key should no longer appear.
20. Install the current version of the SIDEXIS XG software (V2.5.6 or higher).
If the current version of SIDEXIS XG is a patch version, the previous official main version of SIDEXIS XG must be installed before you can install the current version.
21. Update the software to version V04.12.00 or higher (via automatic update) [→ 47].
The error message **E1 11 20** (invalid unit calibration) is displayed.
22. Acknowledge the error message with the R key .
23. Perform a complete unit calibration [→ 145].
After a successful unit calibration has been performed, the error message should no longer appear.
24. Perform an acceptance test (for Germany only) without calling in an expert.
25. Call up the "Extended Details" via SiXABCon.
This generates an XML file (with the system parameters) which is filed in the PDATA/.../P2K_Config directory under the network name of the unit.

- The process is completed.

Case F:

- **Tube assembly from another unit**
- **GALILEOS Comfort**
- **GALILEOS Comfort PLUS**
- **Unit software version V04.12.00 or higher**

IMPORTANT: Replacement is only possible within the same unit class, e.g. the tube assembly must come from a "GALILEOS Comfort^{PLUS}" unit if it is to be installed in a "GALILEOS Comfort^{PLUS}" unit!

1. Switch the unit on.
The error message **E6 15 05** (undefined unit serial number) is displayed. The message No Key is displayed on the Easypad.
2. Press the R key to acknowledge the error message.
Depending on the tube assembly history, the error message **E7 11 15** (incorrect collimator configuration) may be displayed.

3. Press the R key to acknowledge the error message.
   The error message **E6 15 04** (undefined activation data) is displayed.
4. Acknowledge the error message with the R key .
5. Call the service menu [→ 180].
6. Call service routine S008.3 [→ 204].
7. Enter the unit serial number found on the nameplate of the unit [→ 204].
   IMPORTANT: Any serial number which is unknown to the unit will not be accepted by the unit. The serial number entered must be identical to the number on the nameplate of the unit. If an inadmissible serial number is entered, the input will not be accepted and the serial number can be entered again.
8. Call service routine S017.25 and configure the installed diaphragm type.
9. Switch off the unit.
10. Wait for approx. 1 minute. Then switch the unit back on.
    The message No Key should no longer appear.
    The error message **E1 11 20** (invalid unit calibration) is displayed.
11. Acknowledge the error message with the R key .
12. Perform a complete unit calibration [→ 145].
    After a successful unit calibration has been performed, the error message should no longer appear.
13. Call up the "Extended Details" via SiXABCon.
    This generates an XML file (with the system parameters) which is filed in the PDATA/.../P2K_Config directory under the network name of the unit.

- The process is completed.

Case G:

- **New tube assembly**
- **GALILEOS Compact**
- **Unit software version V04.12.00 or higher**

1. Switch the unit on.
2. If the software version of the newly installed DX6 does not match the latest main software version: Perform a software update to the latest version [→ 47].
3. Switch off the unit.
4. Wait for approx. 1 minute. Then switch the unit back on.
   The error message **E6 11 07** (undefined unit class) is displayed. The message No Key is displayed on the Multipad.
5. Press the R key to acknowledge the error message.
   The access level for the service menu (level 4) is automatically started.
6. Press and hold down the Service key until the LEDs above the patient symbol keys light up (approx. 2 s).
7. Then press the patient symbol keys in the sequence b - d - a within the next 4 seconds.
   After you have entered the key combination correctly, the service routine S017, test step 1 (select/confirm system class) is started automatically. The LED above the Memory key lights up.
8. Acknowledge any additional error messages with the R key .

9. Confirm the "GALILEOS Compact" system class (04):
   To do this, first press the Memory key (LED above the R key lights up) and then the R key.
10. Exit the service routine by pressing the arrow key above selection field 3.
11. Switch off the unit.
12. Wait for approx. 1 minute. Then switch the unit back on.
    The error message **E6 15 05** (undefined system serial number) is displayed.
13. Press the R key to acknowledge the error message.
    The error message **E7 11 15** (incorrect collimator configuration) is displayed.
14. Acknowledge the error message with the R key .
15. Call the service menu [→ 180].
16. Call the service routine S008.3, check the serial number, and confirm this if necessary [→ 204].
    The unit serial number is located on the nameplate of the unit.
    NOTICE! If the serial number is incorrect, exit the update process and contact the Sirona Customer Service Center.
17. Call service routine S017.25 and configure the installed diaphragm type.
18. Switch off the unit.
19. Wait for approx. 1 minute. Then switch the unit back on.
    The message No Key should no longer appear.
20. Install the current version of the SIDEXIS XG software (V2.5.6 or higher).
    If the current version of SIDEXIS XG is a patch version, the previous official main version of SIDEXIS XG must be installed before you can install the current version.
21. Update the software to version V04.12.00 or higher (via automatic update) [→ 47].
    The error message **E1 11 20** (invalid unit calibration) is displayed.
22. Acknowledge the error message with the R key .
23. Perform a complete unit calibration [→ 145].
    After a successful unit calibration has been performed, the error message should no longer appear.
24. Perform an acceptance test (for Germany only) without calling in an expert.
25. Call up the "Extended Details" via SiXABCon.
    This generates an XML file (with the system parameters) which is filed in the PDATA/.../P2K_Config directory under the network name of the unit.

- The process is completed.

Case H:

- **Tube assembly from another unit**
- **GALILEOS Compact**
- **Unit software version V04.12.00 or higher**

IMPORTANT: Replacement is only possible within the same unit class, e.g. the tube assembly must come from a "GALILEOS Compact" unit if it is to be installed in a "GALILEOS Compact" unit!

1. Switch the unit on.
   The error message **E6 15 05** (undefined unit serial number) is displayed. The message No Key is displayed on the Multipad.
2. Press the R key to acknowledge the error message.
   Depending on the tube assembly history, the error message **E7 11 15** (incorrect collimator configuration) may be displayed.
3. Press the R key to acknowledge the error message.
   The error message **E6 15 04** (undefined activation data) is displayed.
4. Acknowledge the error message with the R key .
5. Call the service menu [→ 180].
6. Call service routine S008.3 [→ 204].
7. Enter the unit serial number found on the nameplate of the unit [→ 204].
   IMPORTANT: Any serial number which is unknown to the unit will not be accepted by the unit. The serial number entered must be identical to the number on the nameplate of the unit. If an inadmissible serial number is entered, the input will not be accepted and the serial number can be entered again.
8. Call service routine S017.25 and configure the installed diaphragm type.
9. Switch off the unit.
10. Wait for approx. 1 minute. Then switch the unit back on.
    The message No Key should no longer appear.
    The error message **E1 11 20** (invalid unit calibration) is displayed.
11. Acknowledge the error message with the R key .
12. Perform a complete unit calibration [→ 145].
    After a successful unit calibration has been performed, the error message should no longer appear.
13. Call up the "Extended Details" via SiXABCon.
    This generates an XML file (with the system parameters) which is filed in the PDATA/.../P2K_Config directory under the network name of the unit.

- The process is completed.

9.13 Cable

9.13.1 Replacing energy chain 1 completely

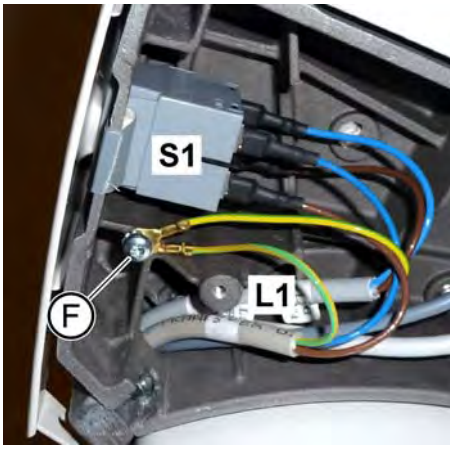
Removing the defective energy chain

IMPORTANT
Remove cable ties
For the following steps, all necessary cable ties should be removed with wire cutters.

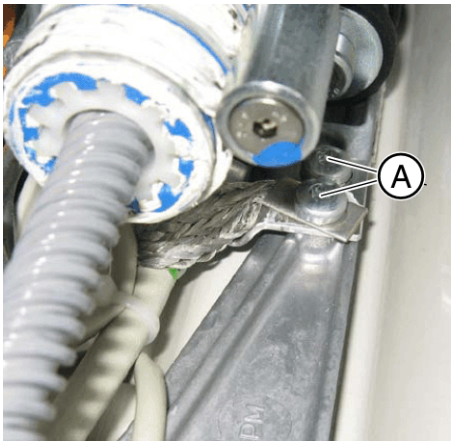
⚠ DANGER

Danger of fatal electrocution!

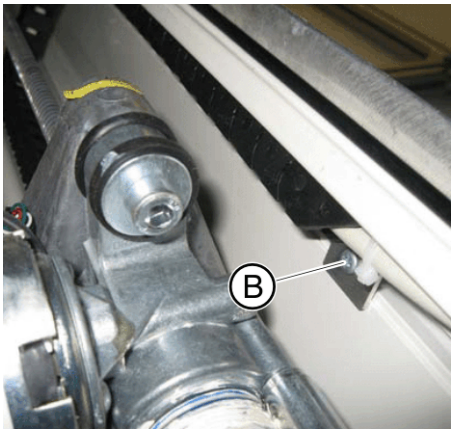
➢ Before you remove the energy chain, switch off the power supply.



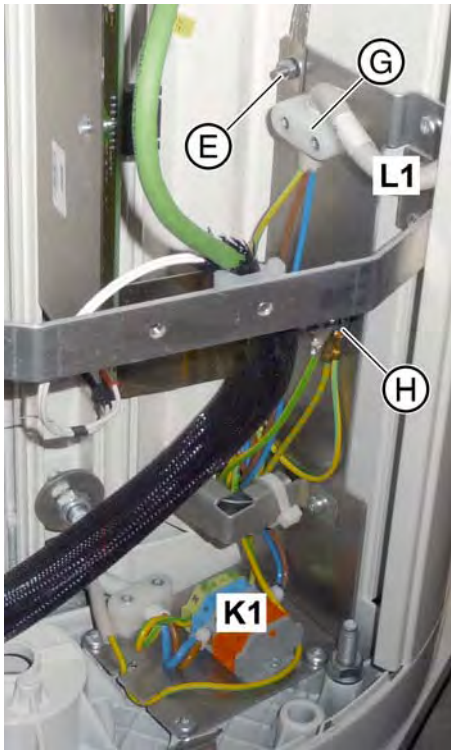
1. Disconnect cable **L1** from switch **S1**.
2. Disconnect cable **L1** from the ground point (F).



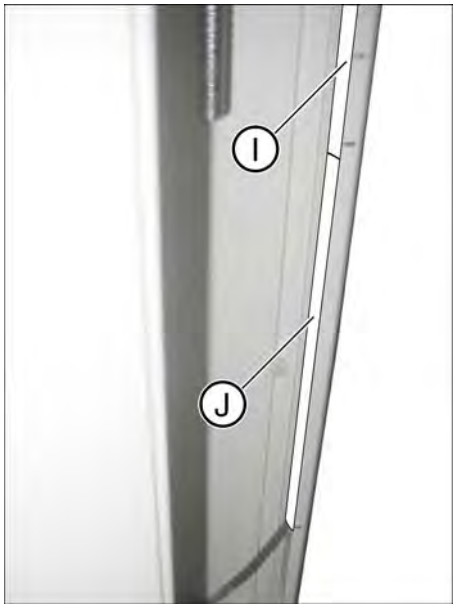
3. Loosen the two screws (A).



4. **If not present:** Mark the position of the screw (B) on the stand.
5. Make a note of the position of the screw (B) for when you later install the new energy chain.
6. Remove the screw (B) from the energy chain 1.



7. Remove the power cable from terminal **K1**.
8. Unscrew the mains filter plate.



9. Remove the cable covers (I) and (J) of the right-hand cable duct.
10. Remove the energy chain along with the mains filter plate from the stand.

Installing the new energy chain

1. Route the energy chain up through the stand from its base.
2. Insert new energy chain 1 in the stand.

IMPORTANT

Assembly instructions

➢ Pay attention to the energy chain's rolling direction.

IMPORTANT

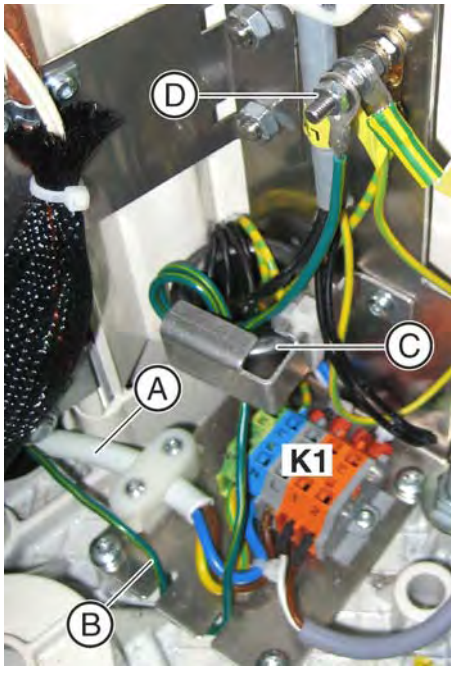
Possible assembly errors

The one end piece has been removed to make the new energy chain easier to lay .

The missing end piece is enclosed.

➢ Attach this end piece to the energy chain only when the energy chain has been laid in the stand.

3. Screw down the mains filter plate.
4. Screw the new energy chain down in the position (marking) of the old energy chain.



5. Screw the power cable (A) to the terminal **K1** and the strain relief.
6. Route the external PE cable (B) over the mains filter plate through the ferrite core twice (C) (two hoses).
7. Screw the external PE cable (B) down on the ground bolts (D).

9.13.2 Replacing cables

⚠ CAUTION

Switch the unit off before you start replacing cables or removing connectors.

NOTICE

Be careful not to twist the cables or kink the fiber-optic light guides when installing them.

Always check the cables before replacing them [→ 133].

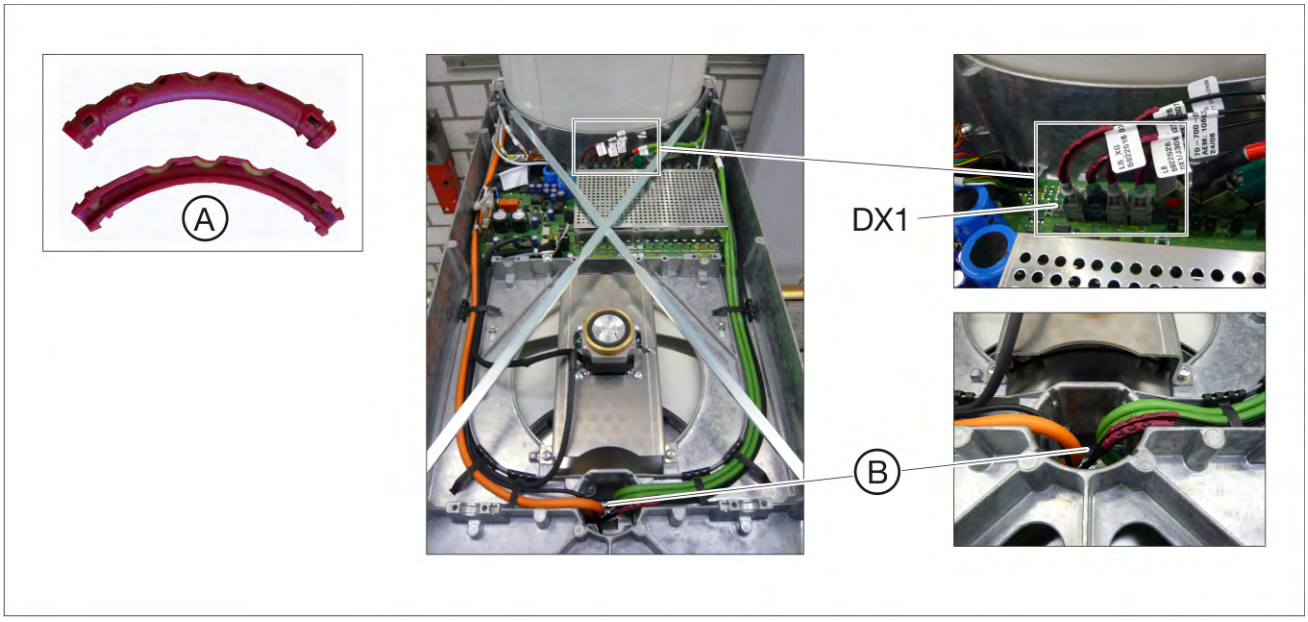
The cables are labeled with small flags. They specify the designation and part number of the cable. The plugs and sockets on the cables are designated both on the boards and cables. Check the designation when you pull off the cables.
Some cables feature markings of green adhesive tape. Mark the corresponding positions on the unit before removing an old cable. Lay the new cable so that the cable markings again come to rest at the corresponding positions marked on the unit while removing the old cable.

An overview of all cables can be found in the chapter .

9.13.2.1 Replacing fiber-optic cable L5, L6 or L15

IMPORTANT: If a radius limiter is not yet installed: When replacing one cable, all existing fiber-optic cables (L5, L6 or L15) should be retrofitted with the radius limiters included with delivery! The radius limiters improve torsional and bending force tolerance.

1. Remove the defective fiber-optic cable.



2. **NOTICE! Do not kink or twist fiber-optic cables, the bending radius may not be less than 20mm, otherwise it is at risk of breaking!** Attach the radius limiter (**A**) close to the connector, which is plugged onto board **DX1**, onto the cable.
3. Plug the connector of the new fiber-optic cable to the same color assignment on the board **DX1**.
4. Lay the fiber-optic cables up to point (**B**), and clip the radius limiter (**A**) at point (**B**) (approx. 900 mm from the connectors on DX1) onto the cable.
5. Guide the fiber-optic cable to board **DX6** and plug the connector of the new fiber-optic cable to the same color assignment on board **DX6**.

9.13.2.2 Cable replacement (L3, L5, L6, and L15)/Laying the cable/ corrugated tube at the rotation unit

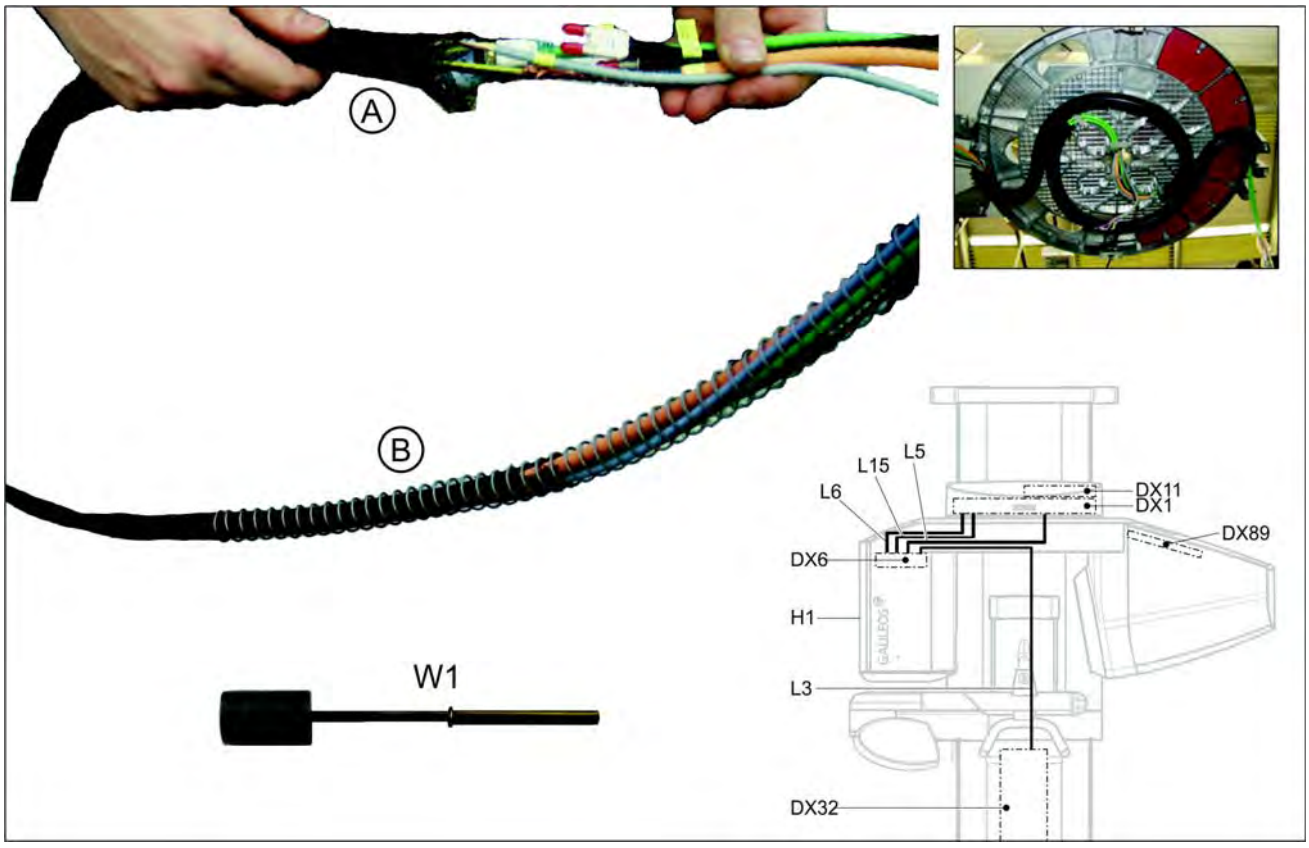
NOTICE

The connectors and cables must be protected by inserting them in the fabric tube (**A**) supplied with the cables.

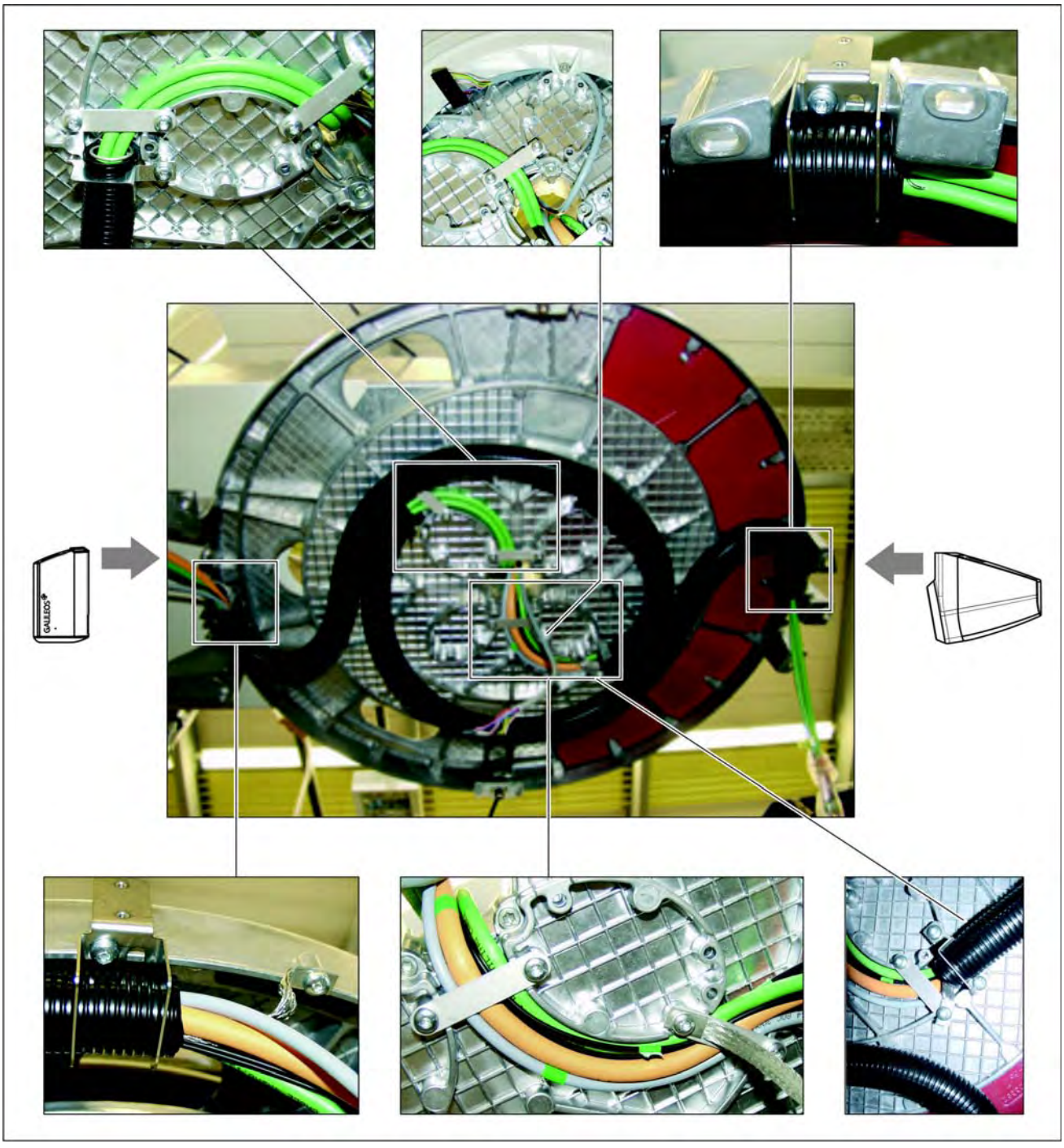
Prepare the cable exchange

1. Remove the covers.
2. Pull the connectors off board **DX6**.

Replacing cables



1. For **L3**: Remove the connector of the cable with tool **W1**.
2. Remove the corrugated tube and the spiral spring (**B**) from the cable loom.
3. Remove the defective cable and run the new cable up to the rotary ring in the original position.
4. Bunch the cables together again to form a loom.
5. Fasten the defective cable to the loom and use it as a pull wire to pull the loom through the fabric tube (**A**).
6. Pull the fabric tube over the connector and as far over the cable loom as possible.
7. Use the pull wire to pull the fabric tube into the spiral spring (**B**).



8. Slide the corrugated tube over the spiral spring.
9. Remove the fabric tube and the pull wire.

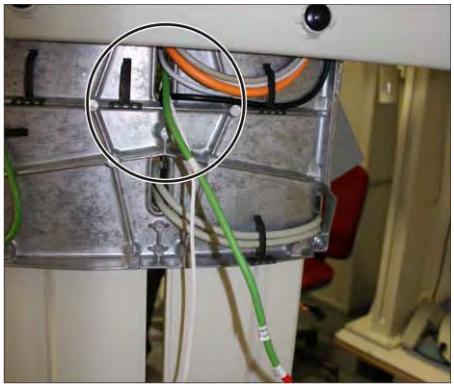
Laying the corrugated tube or cable at the rotation unit

1. Lay the corrugated tubes and cables back in their original position.
2. Plug the connectors back in again.
3. Reattach the covers.

9.13.2.3 Replacing cable L7/L117 or L108 in cable track 2

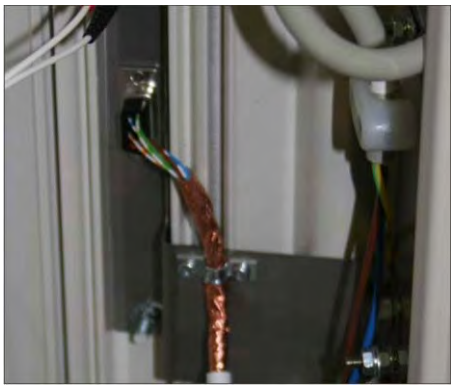
1. Switch the unit on.

2. Move the slide downward to a pleasant working position using the Up/Down keys on the control panel.
3. Switch the unit off again.
4. Remove the "arm cover".
5. Remove the two cross braces and the cover plate of board **DX1**.
6. **NOTICE! Wrap the connector X303 (cable L108) with adhesive tape immediately after pulling it off to protect the detent at the connector against breaking off.**
   Disconnect the fiber-optic cable **L7/L117** and cable **L108** from board **DX1**.
7. Switch the unit on.
8. Use the Up/Down keys on the control panel to move the slide up.
   Tip: If the height adjustment motor is inoperative, you can also move the slide manually. [→ 251]
9. Switch the unit off again.
10. Remove the covers "Intermediate piece" and "Profile (top and bottom)".
    Tip: While loosening the screws, press the top profile cover down towards the unit and allow it to slide down once the screws are loose.
11. Remove board **DX32** (Removing board DX32 [→ 254]).
12. Detach fiber optic cable **L7/L117** and cable **L108** from the cable clamps at the rear of the unit and pull the cables through the slit in the slide toward the front into the stand.



13. Unscrew the angle brackets on both sides of the cable track.

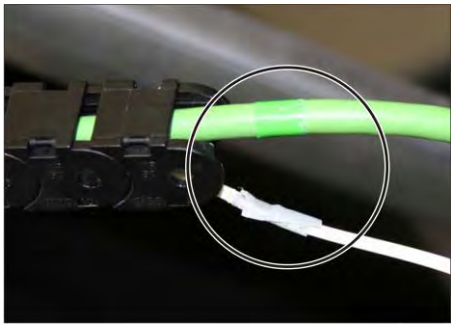
14. Remove the motor-side end piece from the cable track.



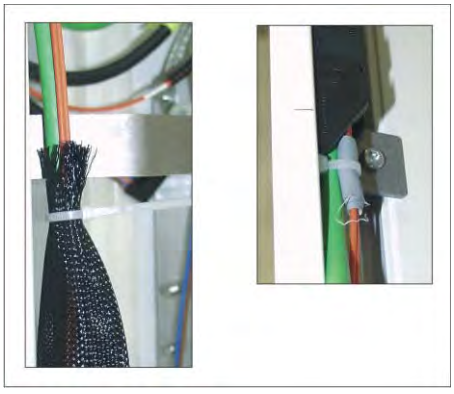
15. With defective cable **L7/L117**: Unscrew cable **L7/L117** from the interface board and remove the shield.
    If cable **L7/L117** should be intact and used again, this step is not necessary. Unless it is not possible to lay down the cable track flat near the stand (see next step).
16. Remove the cable ties from the cable track and lay the cable track down on a flat surface stretched out.

17. **CAUTION! You must observe the position of connector X303 of cable L108 (see image).**
    Carefully pull both cables (together) out of the cable track and the fabric tube.
18. With defective cable **L108**: Wrap the connector **X303** of the new cable **L108** with adhesive tape to protect the detent against breaking off.
19. Lay the cable track down on a flat surface stretched out.

20. Fasten the two (new) cables together with adhesive tape above the flag labels.



21. **CAUTION! Push the green cable. The white cable is carried along. In this way, you can prevent the sensitive fiber optic cable from being damaged.** Push both cables (together) into the cable track up to the cable markings.
New cables do not have cable markings. Orientate yourself according to the marking on the second (old) cable and make sure that both cables protrude equally far out of the cable track once they have been drawn in. Then make a mark on the new cable.



22. **NOTICE! The cable ties should only fix the position of the cables. They must not be tightened too much, otherwise fiber-optic cable L7 could be damaged.**
Before installing the cable track in the stand, fix the cables at both ends of the cable track with a cable tie.
23. Reinstall the cable track in the stand.
Installation of the cable track is performed in reverse order of the removal.

9.13.2.4 Replacing cable L1 or grounding strap in cable track 1

The procedure for replacing cable **L1** and the grounding strap is basically analogous to the procedure described in chapter Replacing cable L7/ L117 or L108 in cable track 2 [→ 327].

10 Maintenance

⚠ DANGER

Potentially lethal shock hazard!

It is essential to switch the unit off and to wait at least 1 minute, or 4 minutes if disconnecting the tube assembly (cable L3), before starting the maintenance or taking off a cover panel!

⚠ CAUTION

Risk of electric shock!

Always switch the unit off before ...
...connecting a measuring instrument or
...carrying out continuity checks.

NOTICE

Risk of damage to boards

Please observe the usual precautionary measures for handling printed circuit boards (ESD). Touch a ground point to discharge static electricity before touching any boards.

NOTICE

Risk of damage to tube assembly

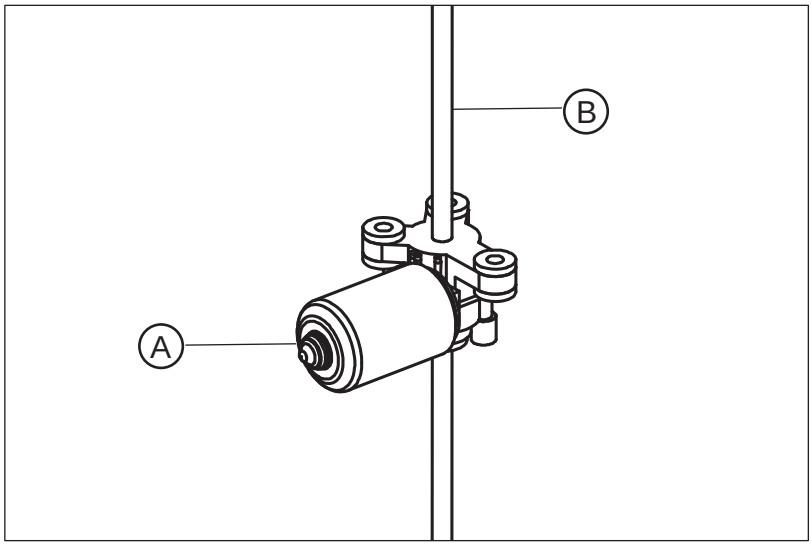
Keep to the prescribed cool-off periods if several exposures have to be taken to check a measured value.

IMPORTANT: Select the correct current/voltage type and adjust the measuring range to match the expected readings.

10.1 Calibrating the unit

Unit calibration is described in detail in the chapter entitled Adjusting and calibrating the unit [→ 145] .

10.2 Checking the height adjustment



Check the threaded rod and motor for abrasion

➢ Perform a visual inspection of height adjustment motor (**A**) and spindle (**B**) for abrasion.
If significant abrasion is present:

↳ Replace the height adjustment motor including spindle [→ 250].

Check whether the height adjustment produces atypical running noises

➢ Use the Up/Down keys on the control panel to move the unit up and down through its entire adjustment range.
If the mechanics of the height adjustment is defective, a speed-dependent hammering noise may occur which points to bearing damage at the height adjustment motor.
If a hammering noise occurs:

↳ Replace the height adjustment motor including spindle [→ 250].

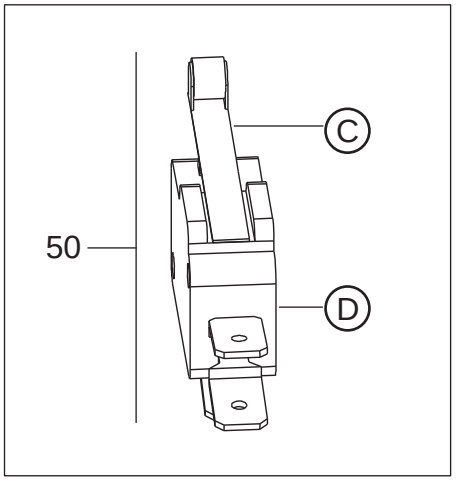
Check whether precise, jolt-free height adjustment is possible

If the unit is not used for a longer period of time, a slight jolt may occur the first time it starts moving. However, the next time it starts moving, it must execute a jolt-free soft start.

➢ Use the Up/Down keys on the control panel to move the unit and observe the movement of the slide. The slide must start in gentle starting and then change over to a faster movement.
If the height adjustment cannot be correctly positioned in detail using the gentle start:

↳ Lubricate the spindle with a light coat of **Chesterton 622**.

Check whether the height adjustment limit switches are functioning properly



➢ Manually press the actuators (**C**) of both limit switches (**D**) one after the other while the height adjustment motor is running. The motor must stop.
If the motor does not stop:
- Check the corresponding microswitch and replace if necessary
- Check cable **L19**, replace if necessary.

Check whether an audible signal can be heard during height adjustment

➢ Use the Up/Down keys on the control panel to move the unit up and down. An acoustic signal must be audible.
If no acoustic signal sounds:
- Replace board DX1 [→ 302].

10.3 Checking the cables for damage

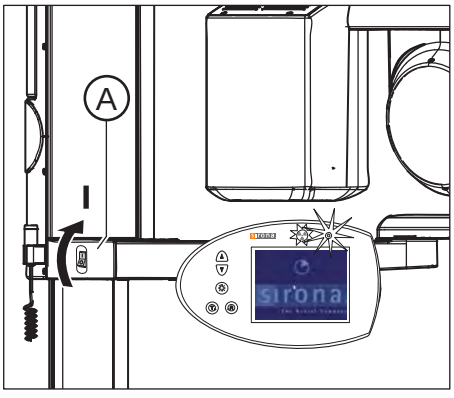
Check whether the cables feeding the unit are OK

➢ Perform a visual inspection of the power cable, protective ground wire, control cables and data cables.
If cables exhibit external damage:
- Replace the respective cable [→ 324].

10.4 Checking the tube data

10.4.1 Checking the tube voltage

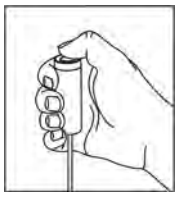
Preparing the measurement



1. Attach the Mult-O-Meter sensor in the middle of the X-ray detector.
2. Set the main switch (**A**) to **I** (see also Operating Instructions).
3. Wait for approx. 1 minute.
4. Press the R key.
   - The unit moves to its starting position.

Performing measurements

1. Call the Service menu and the Service routine **S002.5** (see Service Manual).
2. Select kV/mA level **85 kV/7 mA** and **4 seconds** of radiation time (see Service Manual).



3. **CAUTION! Activating the release button triggers X-rays.**
   Release radiation. Hold the release button pressed until the set radiation time has expired.

Analyzing measurements

➢ Read the voltage values on the display of the Mult-O-Meter.

IMPORTANT
The measured tube voltage must correspond with the tube voltage set of 85 kV. The permissible tolerance is ± 10 %.

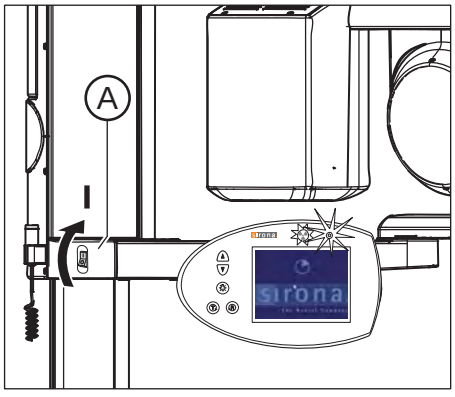
- If the measured values *do not fall within the permissible tolerance range*, replace the *tube assembly* (see Service Manual).
- If the measured values are within the permissible tolerance range, finalize the measurement.

Concluding the measurement

1. Exit the service routine.
2. Switch the unit on via switch (**A**) (see also Operating Instructions).

10.4.2 Checking the radiation time

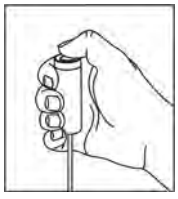
Preparing the measurement



1. Attach the Mult-O-Meter sensor in the middle of the X-ray detector.
2. Set the main switch (**A**) to **I** (see also Operating Instructions).
3. Wait for approx. 1 minute.
4. Press the R key.
   - The unit moves to its starting position.

Performing measurements

1. Call the Service menu and the Service routine **S002.5** (see Service Manual).
2. Select kV/mA level **85 kV/7 mA** and **4 seconds** of radiation time (see Service Manual).



3. **CAUTION! Activating the release button triggers X-rays.**
   Release radiation. Hold the release button pressed until the set radiation time has expired.

Analyzing measurements

➢ Read the radiation time on the Mult-O-Meter.

- The value displayed on the Mult-O-Meter for the radiation time must be **4 s**. The permissible tolerance is ± 10 %.
- If the measured radiation time does *not* fall within the permissible tolerance, replace the *tube assembly* (see Service Manual).

↳ If the measured radiation time falls within the permissible tolerance, finalize the measurement.

Concluding the measurement

1. Exit the service routine.
2. Switch the unit on via switch (**A**) (see also Operating Instructions).

10.4.3 Checking the fan and temperature sensor

Check whether the fan is functioning

➢ Check the function of the fan using service routine S005.4 [→ 193].

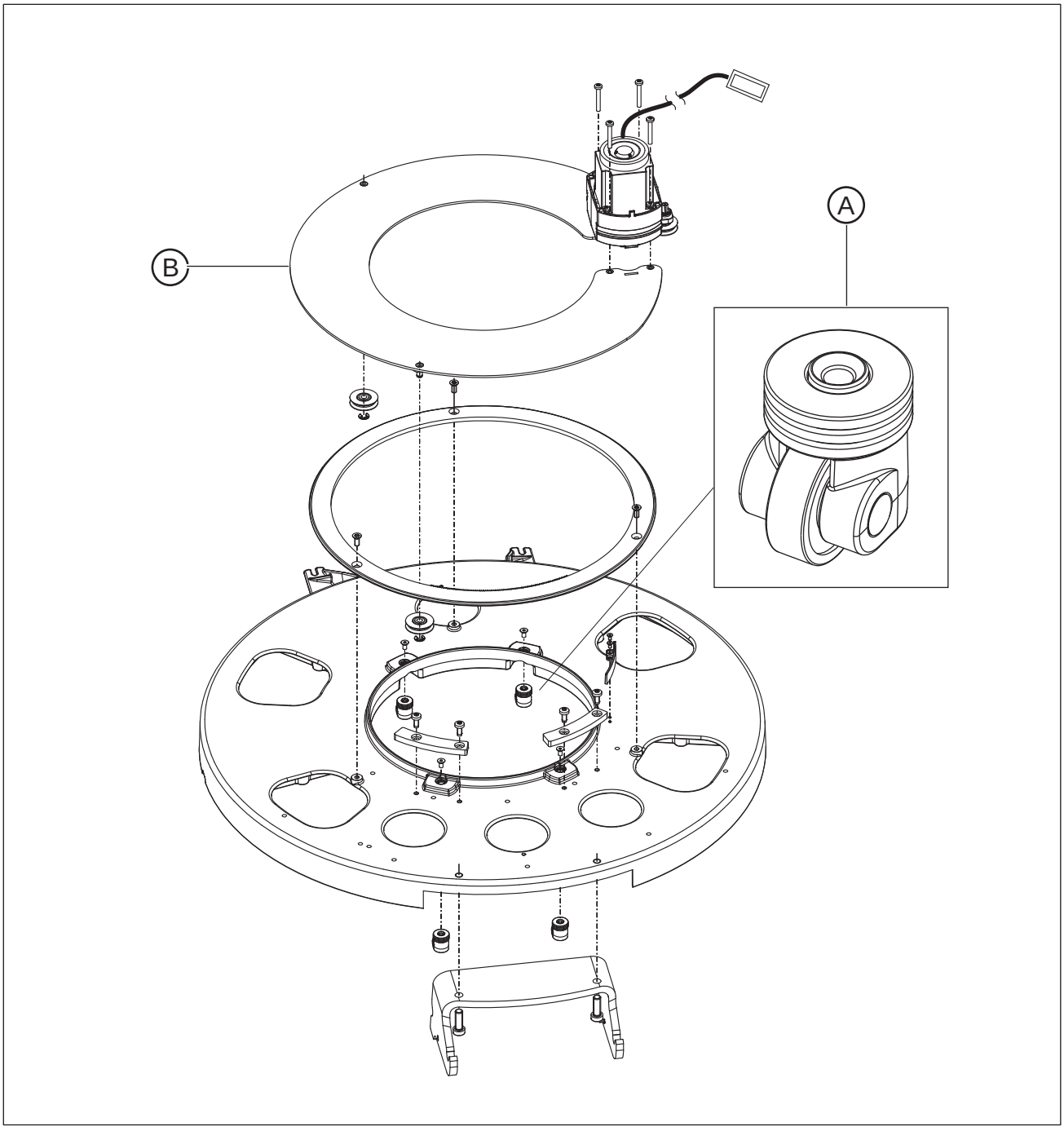
↳ If the fan is defective: Replace the fan.

Check whether the temperature sensor is supplying plausible values

➢ Read the temperature in the single tank with service routine S005.5 [→ 193].

↳ If the displayed temperature reading is not plausible: Replace the tube assembly [→ 316].

10.5 Checking the idling rollers



Check whether the idling rollers (A) are OK

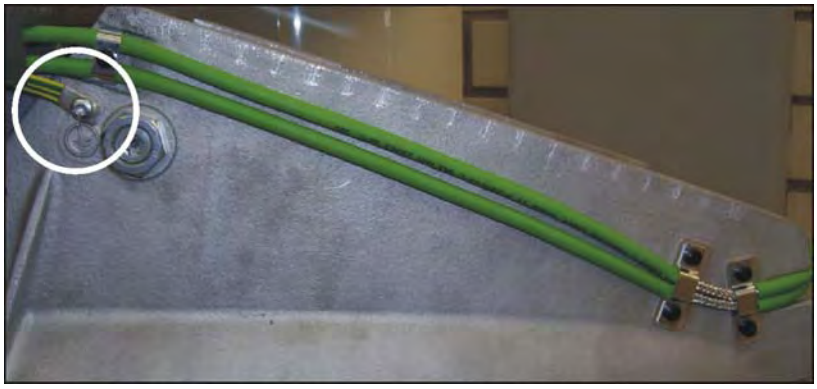
➢ Manually turn the ring (**B**) and check it for smooth and easy movement.
If the ring does not move smoothly and easily:

↳ Remove the housing covers and check the idle rollers (**A**) for dirt and foreign particles. Clean and remove foreign particles if necessary.

10.6 Checking the grounding straps

Grounding strap in the stand

Grounding strap on the image detector

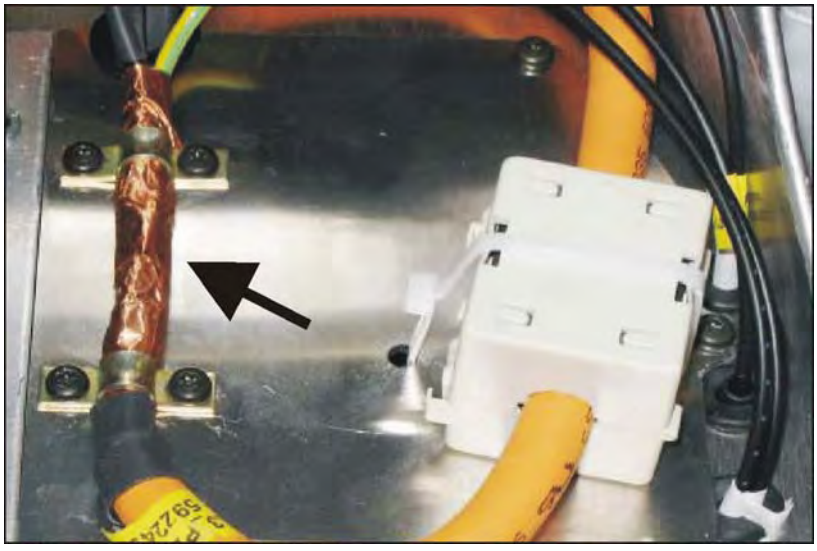


Check whether the grounding straps have complete and firm contact

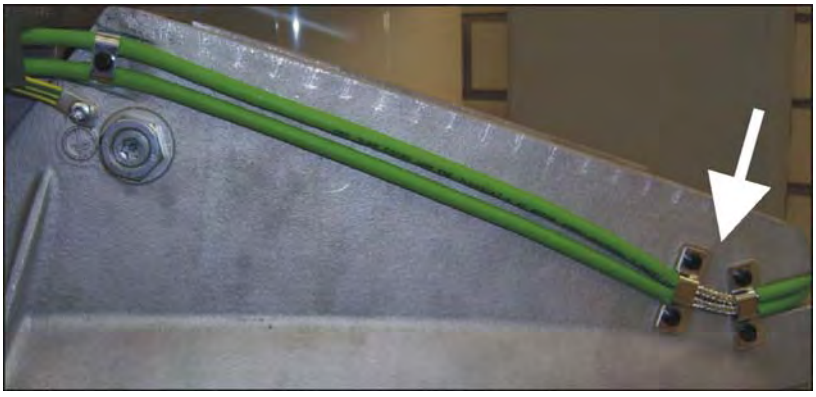
1. Perform a visual and “hands-on” inspection of the grounding straps to ensure that they have complete and firm contact at the positions marked.
   If the grounding straps do not have correct contact:
   ↳ Fasten the grounding straps correctly.
2. Perform a visual inspection of the grounding straps for damage.
   If the grounding straps are damaged:
   ↳ Replace the grounding straps.

10.7 Checking the cable shields

Shield on the tube assembly



Shield on the X-ray detector



Shield on the housing

Check whether the cable shielding is OK

➢ Perform a visual and “hands-on” inspection of the cable shields to ensure that they have complete and firm contact at the positions marked.
If the cable shields do not have correct contact:

↳ Fasten the cable shields correctly.

10.8 Checking the protective ground wires

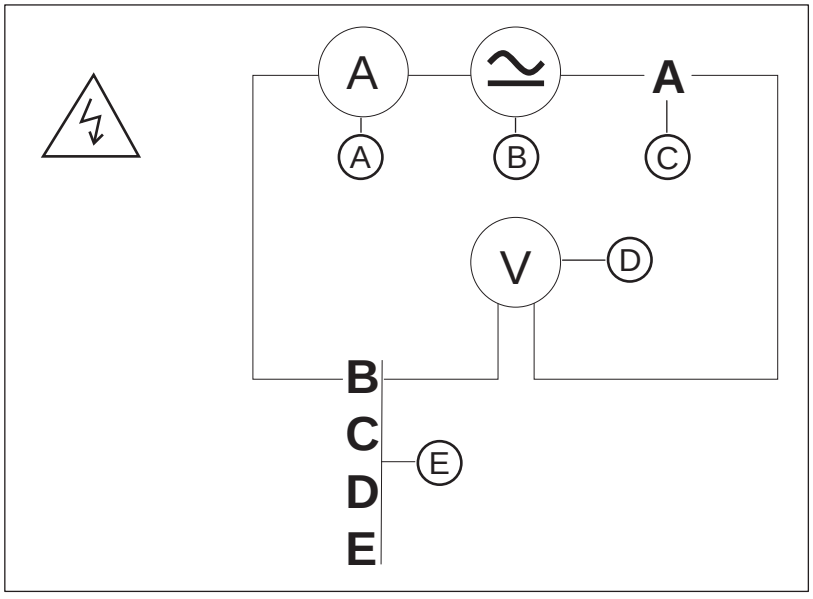
⚠ DANGER

Perilous shock hazard!

It is essential to switch the unit off and to wait at least one more 1 minute before beginning the check!

1. Switch the line voltage off at the main switch of the building installation.
2. Disconnect the power cable and the second protective ground wire from the building installation.
3. Remove the "bottom profile", "front tube assembly", and "rear tube assembly" covers.

Measuring setup for protective ground wire test



A	Ammeter
B	Power source
C	Measuring point **A**, central protective ground wire
D	Voltmeter
E	Measuring points **B** - **E**

Check whether the ground wire resistance complies with the specifications

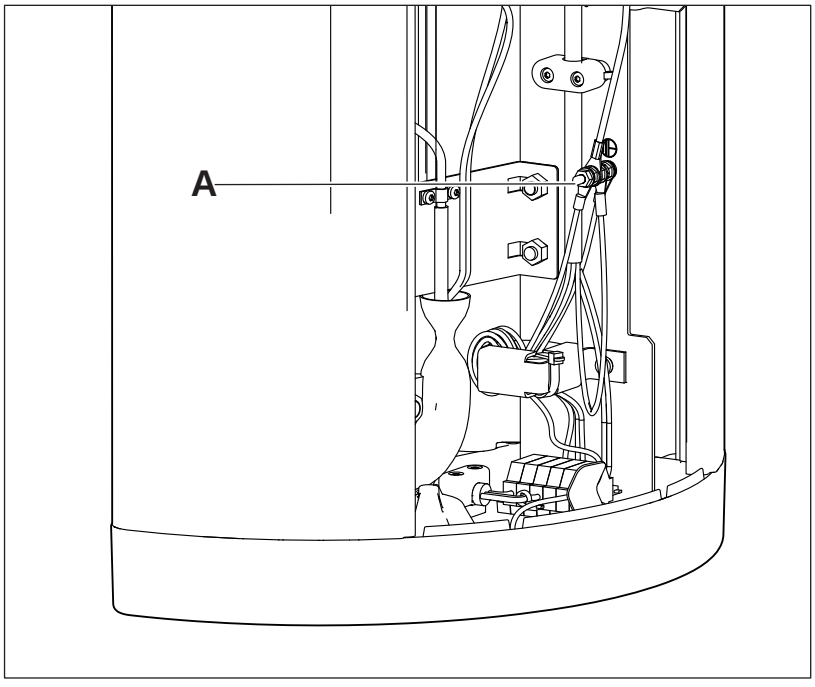
A and **B**	GNYE wire	0.1 Ω
A and **C**	2. Protective ground wire	0.1 Ω
A and **D**	Housing DX32	0.2 Ω
A and **E**	Tube assembly housing	0.2 Ω

✓ A power source with a current of at least 0.2 A , a no-load voltage of 24 V max. and 4 V min. is required.

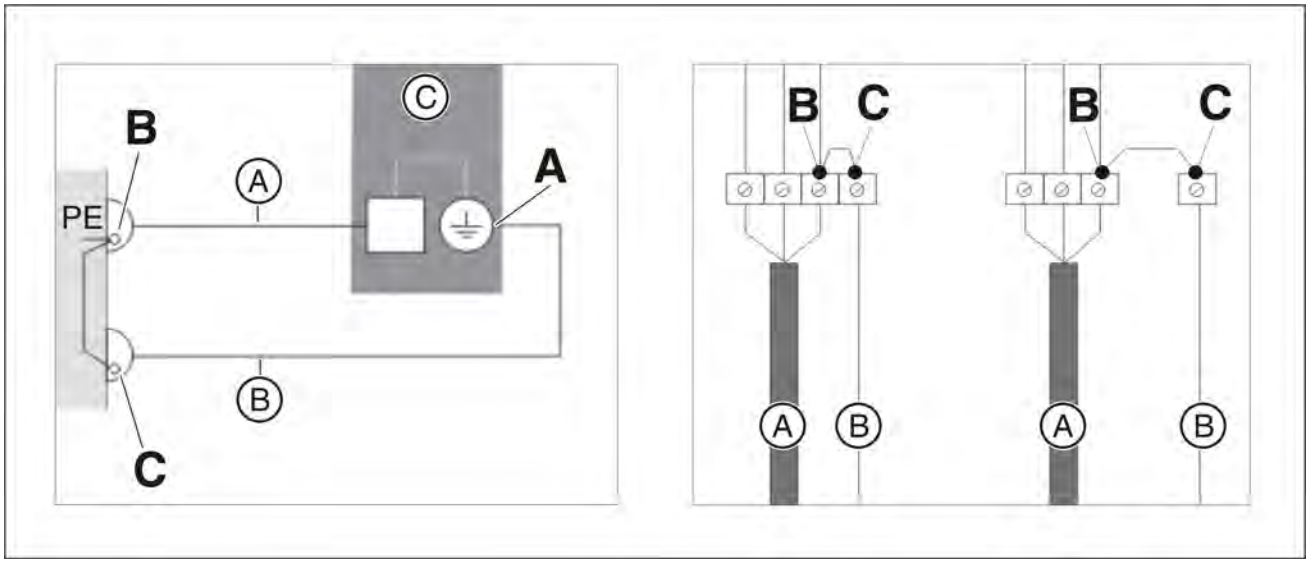
1. Connect the power source between the measuring points specified in the table for at least 5 s.
2. Measure the voltage drop with the voltmeter, measure the current with the ammeter, and calculate the resistance using the formula **R = U / I**.
   - If the resistance value is greater than indicated in the adjacent table, check whether the protective ground wires are fastened according to the specifications.
     Check whether plain washer, tooth lock washer and cable lug are installed on the protective ground wire in the correct order and whether the nuts of the protective ground wire connections are firmly tightened.
     If the fastening of the protective ground wires does not meet the specifications, fasten the protective ground wires correctly.

Tip: Do not connect the power cable and the second ground wire to the building installation yet. Check the device leakage current first [→ 343].

Measuring point A: Central protective ground wire

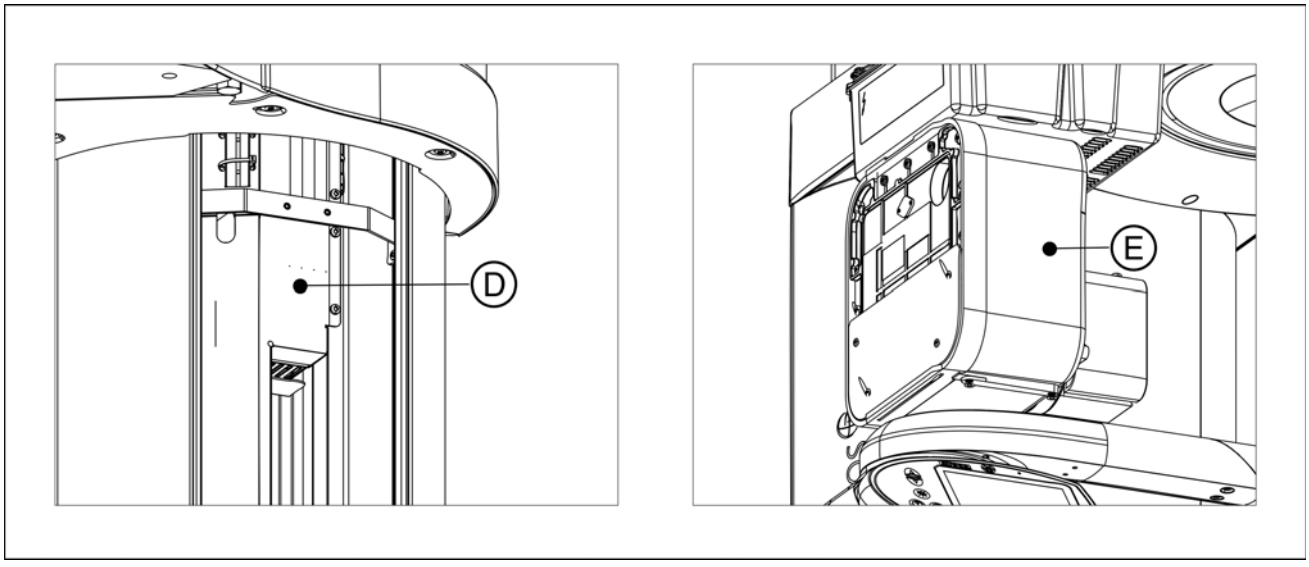


Measuring points B and C: GNYE power connection and 2nd ground wire



A	Power cable to the unit
B	Second protective ground wire
C	Unit

Measuring points D and E: Board cage DX32 and tube assembly housing



D	Board cage DX32
E	Tube assembly housing

10.9 Checking the device leakage current

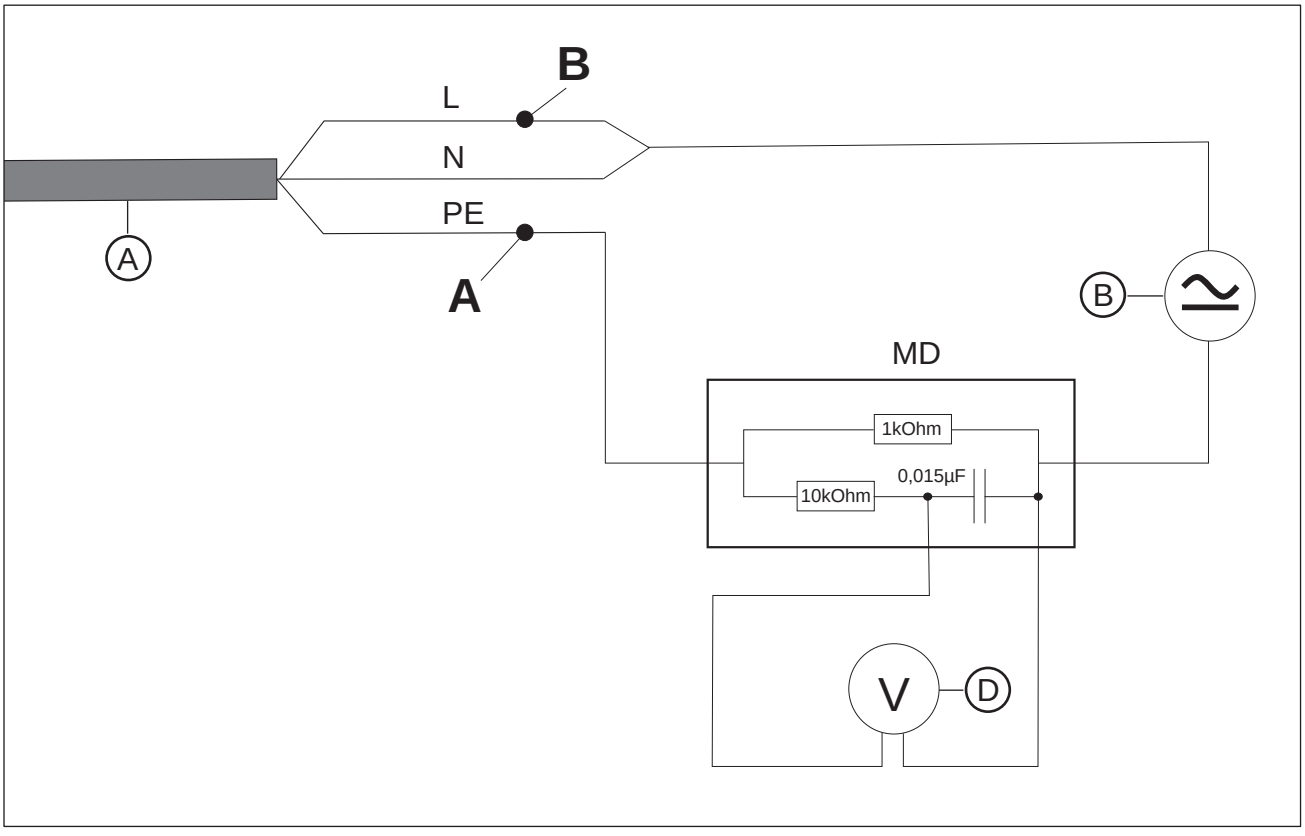
⚠ DANGER

Potentially lethal shock hazard!

It is essential to switch the unit off and to wait at least one more 1 minute before beginning the check!

A high resistance measuring voltage source at line frequency and a measuring circuit compliant with the requirements of IEC 60601 are required. Complete test units, e.g. the "Bender tester", fulfill these requirements.

Measuring setup for testing the device leakage current



A	Power cable to the unit
B	Voltage source: 200-240V, 50Hz/60Hz
D	Voltmeter

1. Switch the line voltage off at the main switch of the building installation.
2. Disconnect the power cable and the second protective ground wire from the building installation.
3. Remove the "profile" cover.
4. Check whether the unit power switch is turned on.

5. Connect a high-resistance measuring voltage source between the short-circuited power cable (**B**) and the protective ground wire (**A**).
6. Measure the voltage drop via **MD**.
   The measured value must not exceed 5 mA.
   - ↳ If the leakage current is not correct: Troubleshoot the problem following the instructions in Device leakage current too high [→ 133] .
7. Reconnect the unit to the building installation (see the installation instructions for the unit).

11 Dismantling and disposal

11.1 Dismantling and reinstallation

When dismantling and reinstalling the system, proceed according to the installation instructions for new installation in order to guarantee its proper functioning and stability.

The X-ray unit must be recalibrated whenever structural alterations in the area surrounding the X-ray room or new installations have been performed.

11.2 Disposal

Your product is marked with the adjacent symbol. Within the European Economic Area, this product is subject to Directive 2002/96/EC as well as the corresponding national laws. This directive requires environmentally sound recycling/disposal of the product. The product must not be disposed of as domestic refuse!

Please observe the disposal regulations applicable in your country.

Disposal procedure

We advise that this product is subject to the stipulations in EC guideline 2002/96 governing waste electrical and electronic equipment and must be disposed of in line with these special requirements within the European Union (EU).

Prior to disassembly / disposal of the product, it must be fully prepared (cleaned / disinfected / sterilized).

When disposing of equipment permanently, please proceed as follows:

In Germany:

To initiate return of the electrical device, please send a disposal order to "enretec GmbH".

1. You can find a form for placing a disposal order on the company's homepage (www.enretec.de) under the menu item "Entsorgung elektrischer und elektronischer Geräte" (Disposal of electric and electronic devices). The form can either be downloaded or completed online.
2. Fill out the form with the corresponding details and send it either as an online order or fax it to enretec GmbH at +49(0)3304 3919 590. You can also get in touch with the following contacts for disposal orders and any questions relating to this you may have:
   Phone: +49(0)3304 3919 500;
   By e-mail: pickup@eomRECYCLING.com
   Mailing address: enretec GmbH, Geschäftsbereich eomRECYCLING Kanalstrasse 17, 16727 Velten

↳ Your equipment that is not permanently installed will be collected in the practice, while your permanently installed equipment will be collected curbside at your address at the agreed time and date.

All disassembly, transport and packaging costs are to be borne by the owner/operator of the equipment. The disposal itself is free of charge.

Worldwide (outside Germany):

Please contact your local dental equipment specialist for country-specific information on disposal.

The X-ray tube assembly for this product contains an X-ray tube with a potential implosion hazard, a small amount of beryllium, a lead lining and mineral oil.

The unit contains counterbalancing weights made of lead.

12 Service Manual History

Version 1:	Service Manual valid as of February 2013; Software version V04.12.00
Version 2:	Software version V04.14.00

We reserve the right to make any alterations which may be required due to technical improvements.

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